APRIL, 1957

modern castings

Owned by
THE MEN WHO BUY

Fork Lift Trucks:
FIRST STEP IN MECHANIZATION

future meetings and exhibits

APRIL

4-5 . . Manufacturing Chemists' Assn., *Air and Water Pollution Conference*. Shoreham Hotel, Washington, D.C.

9-11 . . American Welding Society, *Welding Show*. Convention Hall, Philadelphia.

10-11 . . Malleable Founders' Society, *Market Development Conference*. Edgewater Beach Hotel, Chicago.

11 . . Association of Lift Truck & Portable Elevator Manufacturers, *Spring Meeting*. Edgewater Beach Hotel, Chicago.

12-13 . . AFS *East Coast Regional Foundry Conference*, Sponsored by the Philadelphia, Metropolitan and Chesapeake Chapters of AFS. Benjamin Franklin Hotel, Philadelphia.

29-May 1 . . Association of Iron & Steel Engineers, *Spring Conference*. Terrace Plaza Hotel, Cincinnati.

29-May 3 . . American Material Handling Society, *7th National Materials Handling Conference*. Convention Hall, Philadelphia.

30-May 2 . . Investment Casting Institute, *Annual Spring Meeting*. Park Sheraton Hotel, Washington, D. C.

MAY

5-9 . . American Ceramic Society, *Annual Meeting*. Statler Hilton Hotel, Dallas, Texas.

6-10 . . American Foundrymen's Society, *The 1st Engineered Castings Show*. Music Hall, and *The 61st Castings Congress*, Netherlands-Plaza Hotel, Cincinnati.

8-9 . . Non-Ferrous Founders' Society, *Annual Meeting*. Netherland-Hilton Hotel, Cincinnati.

JUNE

2-6 . . Air Pollution Control Assn., *Golden Jubilee Meeting*. Jefferson Hotel, St. Louis.

13-14 . . AFS *Chapter Officers Conference*. Sherman Hotel, Chicago.

13-14 . . Malleable Founders' Society, *Annual Meeting*. The Broadmoor, Colorado Springs, Colo.

16-21 . . American Society for Testing Materials, *Annual Meeting*. Chalfonte-Haddon Hall, Atlantic City, N. J.

16-29 . . American Material Handling Society, *Fourth Annual Material Handling Training Conference*. Lake Placid Club, Essex County, New York.

17-21 . . American Society for Engineering Education, *Annual Meeting*. Cornell University, Ithica, N. Y.

20-22 . . AFS *2nd Annual Foundry Instructors' Seminar*, Kellog Center, Michigan State University, East Lansing, Mich.

20-22 . . *Penn State Regional Foundry Conference*, Sponsored by the Rochester, Pittsburgh, Metropolitan, Eastern New York, Western New York, Northwestern Pennsylvania, Central New York, Chesapeake and Philadelphia Chapters, and the Penn State University Student Chapter of the American Foundrymen's Society and the Reading Foundrymen's Assn. Penn State University, University Park, Pa.

23-25 . . Alloy Casting Institute, *Annual Meeting*. The Homestead, Hot Springs, Va.

27-28 . . Refractories Institute, *Annual Meeting*. Greenbrier, White Sulphur Springs, W. Va.

AUGUST

19-24 . . Swedish Foundrymen's Association, and Sveriges Mekanforbund, *24th International Foundry Congress*. Parliament Bldg., Stockholm, Sweden.

SEPTEMBER

17-20 . . American Die Casting Institute, *Annual Meeting*. Edgewater Beach Hotel, Chicago.

23-24 . . Steel Founders' Society of America, *Fall Meeting*. The Homestead, Hot Springs, Va.

27-28 . . AFS *Missouri Valley Regional Conference*, Sponsored by St Louis, Tri-State, and Mo-Kan Chapters and Missouri School of Mines Student Chapter. Missouri School of Mines and Metallurgy, Rolla, Mo.

OCTOBER

3-4 . . AFS *Michigan Regional Foundry Conference*, Sponsored by Central Michigan, Detroit, Saginaw Valley, and Western Michigan Chapters, Michigan State University and University of Michigan. Kellogg Center, East Lansing, Mich.

9-11 . . Gray Iron Founders' Society, *Annual Meeting*. Drake Hotel, Chicago.

17-19 . . Foundry Equipment Manufacturers Assn., *Annual Meeting*. The Greenbrier, White Sulphur Springs, W. Va.

21-25 . . National Safety Council . . *45th National Safety Congress and Exposition*. Conrad Hilton Hotel, Chicago.

NOVEMBER

3-8 . . American Society for Metals and Society for Non-destructive Testing . . *2nd World Metallurgical Congress* & *39th Annual National Metal Congress*. Morrison Hotel, Chicago.

7-8 . . National Foundry Association, *Annual Meeting*. Waldorf-Astoria Hotel. New York.

11-13 . . Steel Founders' Society of America, *Twelfth Technical and Operating Conference*. Carter Hotel, Cleveland.

G.I.F.S. Schedules Series of Meetings on Marketing

A series of regional marketing and sales seminars has been scheduled this spring throughout the United States and Canada by the Gray Iron Founders' Society. Nine two-day meetings will be held to discuss data revealed in surveys of casting buyers and designers and to review foundry sales techniques and policy.

Richard C. Meloy, the society's marketing director, will conduct the meetings. E. Harold Mitchell, G.I.F.S. field director, will coordinate the details with society district directors and local management group officers.

Among the topics for discussion will be the importance of a marketing program, establishing a marketing plan, developing a program to accomplish marketing goals, solving foundry problems and how to establish a do-it-yourself marketing program.

The marketing program, less than one year old, has revealed data concerning what customers want in castings and what customers think foundries must do to compete with other methods forms of fabrication.

The survey has indicated that marketing programs of gray iron foundries have not been keeping pace with the technological progress and that a broad educational program is needed to acquaint customers with the advantages of gray iron castings. It has been pointed out that the industry has not kept casting buyers and engineers informed of the latest advances made in the laboratory and production. The survey shows that assistance to customers must be made to properly engineer each casting to the particular job it is to perform. Failure to do this has resulted in competitive forms of fabrication, the survey reveals.

The area meetings with tentative dates are: Chicago, May 28-29; Davenport, Iowa, April 11-12; Cleveland, March 7-8; San Francisco, March 18-19; New England, March 28-29; Hamilton, Canada, April 22-23; Atlantic City, April 25-26; Marshall, Mich., May 2-3.

AFS Preprints Available

Preprints of technical papers to be presented at the AFS 61st Castings Congress at Cincinnati May 6-10 are listed by number in the program section of April MODERN CASTINGS. They are available at nominal cost from the AFS book department, Golf and Wolf Rds., Des Plaines, Ill.

CIRCLE NO. 143, PAGE 7-8

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SECTION

in this issue

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AUDITED PAID CIRCULATION ABC

On The Management Side

■ **The Industrial Yo-Yo.** Predictions of a 15 million ton 1957 for gray iron production are being reduced by a million on account of that well known fifth season—"slack." By examining the bar charts in Foundry Trade News, this issue of MODERN CASTINGS, it becomes apparent that shipments of gray iron, malleable, zinc base and aluminum base castings started to fall off in March of 1956. Compared with the same month in the previous year, shipments were lower for every month except the first two in '56. Tradition was broken in December when more aluminum-base castings were shipped than copper-base. Shipments of sand-cast copper-base castings have been declining steadily from a high of 86 million lb in March to only 58 million in December. On the other hand aluminum-base castings shipments have been steadier. December shipments of the light metal break down into 33 million lb of die castings, 21 million lb of permanent mold castings and 13 million sand castings.

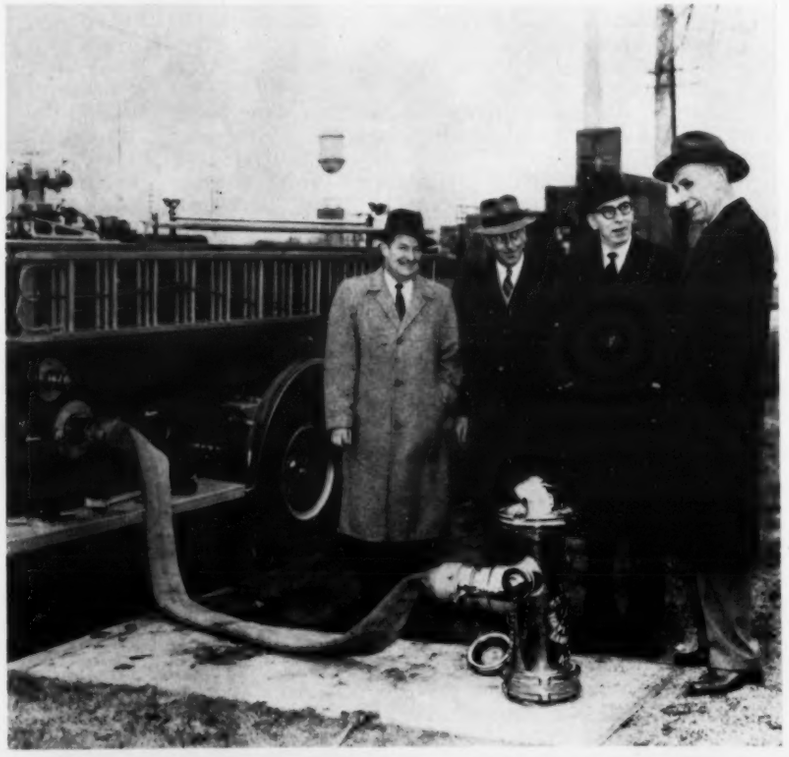
■ **Is Executive Talent Being Developed in Your Company?** Increasing competition for executive talent is making it costly and difficult for any company to go into the open market to obtain needed managerial ability. Just as you constantly strive to upgrade the abilities of your skilled labor, foremen and engineers so should you be grooming the future executives to take over the reins gradually from the elder statesmen of the company. This subject was effectively covered by Lawrence L. Ellis, partner in Booz, Allen & Hamilton, speaking before the Saginaw Valley Chapter of AFS. Ellis pointed out that over 11 per cent of executives in the 400 largest companies are now over the age of 65. An additional 64.5 per cent are over age 50. Consequently, during the next 15 years, 75 per cent of the executives in these companies will need to be replaced.

In a study of more than 3000 executives, the speaker pointed out that there are eight universal characteristics which serve to identify top managerial potential. Select your future executives on the basis of (1) his performance of duties, (2) his energy, perseverance, and drive to get things done, (3) his ability to solve problems, (4) leadership that inspires cooperation and loyalty, (5) his ability to organize his own and the work of others, (6) his initiative, (7) his willingness to assure responsibility, and (8) his creative ability to originate ideas. Todays executives must assume the responsibility of training these men to effectively take over where they leave off.

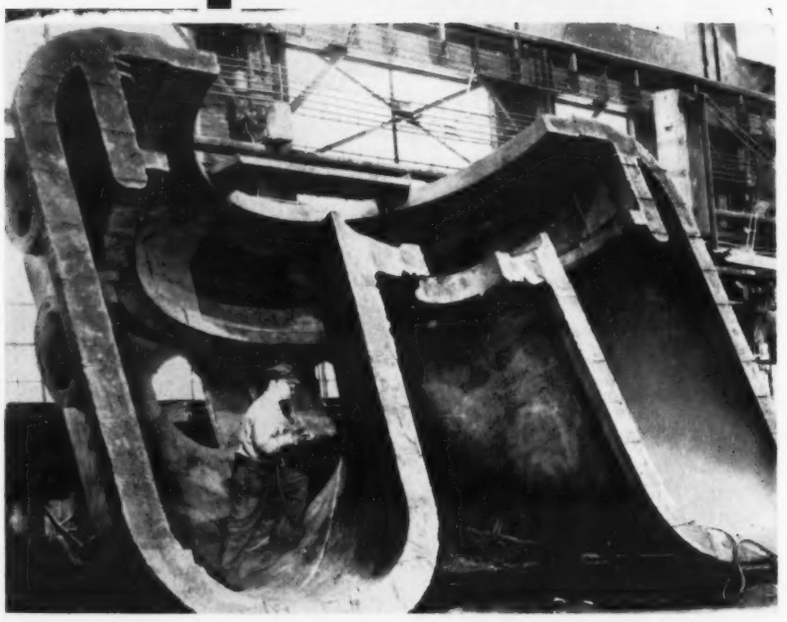
■ **Reverse Those Downward Trends With "Hard-Selling."** The time has come for many foundrymen to realize that advancing the technology of casting is only half the battle. In the past decade he has become so engrossed in raising the tensile strength, hardness, ductility and other physical properties of his product that he has forgot to acquaint his customers to the potentialities of these new engineering materials. The castings producer must step-up his efforts to tell the buyer about his product. An important step in this direction is being taken by the American Foundrymen's Society in sponsoring the First Engineered Castings Show. For the first time in our history, castings producers have an organized opportunity to show the castings buyers and designers of engineered products the quality, utility, and economy attainable in cast metal products.

modern castings album

Plugging aluminum, that's the purpose of this display of the 100 lb of aluminum parts in the Chrysler New Yorker. Cast aluminum pistons, housings, and other mechanical parts indicate that the use of aluminum in automobiles is not limited to trim and ornamentation.



Chromium plug was presented to city of Elmira, N. Y., by Kennedy Valve Mfg. Co. to mark its 80th business year and 50th year of the plant location in Elmira. Company vice-president and sales manager, J. R. Erven, left, inspects the new Kennedy Safety special hydrant with Elmira's water board president, mayor, and fire chief.



A big one is this 101,040 lb iron casting, largest ever produced by General Electric Company's foundry in Schenectady, N. Y. Casting was poured in 3⅓ minutes, but 15 men spent 20 weeks to prepare the pit and mold, and to clean this cast component for a steam turbine.

Small ones are these miniature jack-knives made by Gries Reproducer Corp., New Rochelle, N. Y. "Cast-assembled" die cast knife is made in a single die-casting cycle. Closed knife is only ¾ in. long.

Foundries and Atomic Age Theme of Regional Meeting

The role of foundries in the atomic age will be highlighted at the biennial East Coast Regional Foundry Conference to be held April 12-13 at Philadelphia. Dr. J. M. Simmons, chief of the metallurgical section of the Atomic Energy Commission will discuss *"Metallurgical Requirements for Atomic Applications"* and Dr. William A. Pennington, University of Maryland, will talk on *"Applications of Radioactive Materials in the Foundry."*

Sponsors of the conference are the Philadelphia, Metropolitan and Chesapeake Chapters of the American Foundrymen's Society. W. S. Giele, chairman of the Philadelphia Chapter is general conference chairman. Serving as co-chairmen are Lewis H. Gross, chairman of the Chesapeake Chapter and R. A. Colton, chairman of the Metropolitan Chapter.

The conference will be opened by Chairman Giele followed by a welcoming speech by W. A. Morley, Link-Belt Co., Philadelphia and a National Director of AFS. Harry W. Dietert, AFS Vice-President, will represent the society at the conference.

Friday morning's technical session will be opened by O. J. Myers, Reichhold Chemicals, Inc., who will discuss *"Plastics as Bonding Materials."* Mel Young, U. S. Gypsum Co., will speak on *"New Ideas for the Patternmaker."*

Friday afternoon's sessions will be devoted to atomic and radioactive applications in foundries. The speakers will point out that other industries have adopted techniques developed from the atomic research program.

First on the Saturday morning program will be *"Carbon Dioxide Process"* presented by W. E. Gruver, Meehanite Metals Corp. followed by T. E. Barlow, Eastern Clay Products Dept., International Minerals & Chemicals Corp., who will discuss *"Diaform Molding Equipment."* The final technical sessions will be *"Shell Mold and Core Making Equipment"* presented by Otto W. Winter, Beardsley & Piper Div., Pettibone Mulliken Corp. and *"Vibrating Conveyors in the Foundry"* by J. M. Morris, Carrier Conveyor Corp.

Harry Kessler, Sorbo-Mat Process Engineers, St. Louis, Mo., will be the speaker at the Friday luncheon. Don Roemer, Franklin-Balmar Corp., vice-chairman, Chesapeake Chapter will preside.

Dr. Kenneth McFarland, General Motors Corp., will be the speaker at the Friday banquet. R. A. Colton, conference co-chairman, will preside.

products and processes

fork lift truck Dual drive wheel, battery-powered fork lift truck Model EUT-8024, has 85 in. turning radius, four speeds forward and

reverse, travels loaded at 5½ mph and climbs 10 per cent grade. Features three independent braking systems and device for preventing drifting of uprights under heavy loads. *Clark Equipment Co.*

CIRCLE NO. 1, PAGE 7-8

Core additive, "Dri-Bond Binder" is used with old or new sand without addition of core oil. Said to give good edge, tensile strength and resistance to high metal temperatures, greater waterproofing and higher green strength and hot strength than other dry binders. *Delta Oil Products Co.*

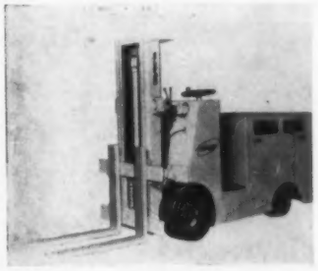
CIRCLE NO. 2, PAGE 7-8

fork lift truck Stand-up fork truck Model A-1484 has 4000 lb capacity with 5¾ mph speed at full

load. Battery powered; motors are series wound type with high load capacity. *Mercury Mfg. Co.*

CIRCLE NO. 3, PAGE 7-8

fork lift truck Electric powered fork truck, 3000 lb capacity, Model F-48T3, designed for low head-



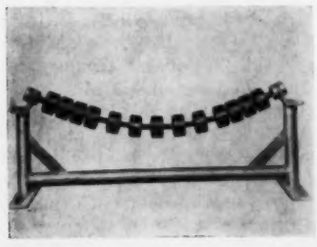
room work. Operator's seat is 18 in. lower than conventional models. *Elwell-Parker Electric Co.*

CIRCLE NO. 4, PAGE 7-8

Hydro-arc electric furnaces, said to give higher thermal efficiency through use of constant arc for automatic heating and melting the charge. Also has air-counter-balanced hydraulic electrode positioning equipment. *Whiting Corp.*

CIRCLE NO. 5, PAGE 7-8

Conveyor belt idler, "Limberoller", is easily installed and maintained. Used in molding department of automobile co.'s Cleveland foundry. It is a flexible, single-roll belt conveyor idler suspended from a bearing at each end to form a catenary. A single roll forms its own trough, turns on its own axis and provides an efficient

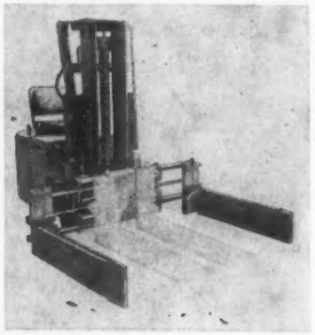


support for a belt conveyor. One installation is a 225-ft conveyor with 30-in. belt to carry, return, and spill sand which falls through floor grates. Bearings are out of way of sand and

require only initial lubrication. Systems doesn't require middle supports, easier to maintain and can be replaced without stopping the conveyor. *Joy Mfg. Co.*

CIRCLE NO. 6, PAGE 7-8

fork lift truck Clamp attachments for electric fork truck line may be used for pallet-less handling



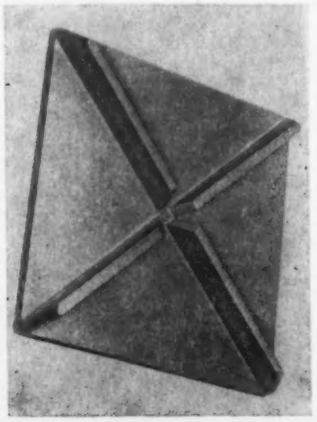
or with pallets. Offered in rider-type or walk-type trucks ranging from 1000 to 6000 lbs. *Lewis-Shepard Products, Inc.*

CIRCLE NO. 7, PAGE 7-8

Plastic firebrick "Helspot" for lining ladles or metallurgical furnaces is made from fine clay blended with graphite and special bonding agent. Available in brick form, dry for use as mortar, ladle wash coatings and for casting shapes on the job. *Mexico Refractories Co.*

CIRCLE NO. 8, PAGE 7-8

Core plates, aluminum, feature ribbed design for heat circulation below the core plate; said to cut baking cycle and give more even heat distribution.



Light weight facilitates handling. Available in standard or custom sizes. *Jo-El Co.*

CIRCLE NO. 9, PAGE 7-8

Hand truck, motorized, handles up to 1000 lb., has three speeds for-

Old——Old——Old——Old

Tell The Editor

The Editor is looking for the ten oldest foundries still in operation in the United States or Canada. If you think that your plant is a real old timer–tell the Editor.

Here's the name of the plant I think belongs on the list of the ten oldest _____

_____

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Name ..... **Position or Title** ..... **Important**

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Company .....

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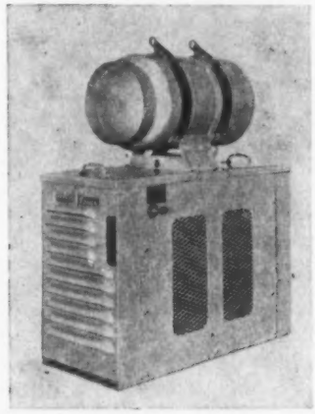
ward and one in reverse. Both wheels powered for traction on uneven terrain. Speeds up to 4 mph and gross weight of 275 lb. *Walco Supply Co.*

CIRCLE NO. 10, PAGE 7-8

fork lift truck LPG-Electric power conversion unit, Model W12 fits electric powered hand trucks. Gives continuous duty electric power



plus low maintenance of LP-gas. Unit features an interchangeable 20-lb fuel cylinder. Conversion to LPG-electric drive can be made in the field. *Ready-Power Co.*

CIRCLE NO. 11, PAGE 7-8

Air hammer weighs 50 oz, operated with one hand, gives up to 9000 blows per minute. Uses 6.5 cfm or air at 1500 psi. Designed for cleaning castings, grooving steel or cast

iron and scaling and cleaning welded joints. *Superior Pneumatic & Mfg., Inc.*

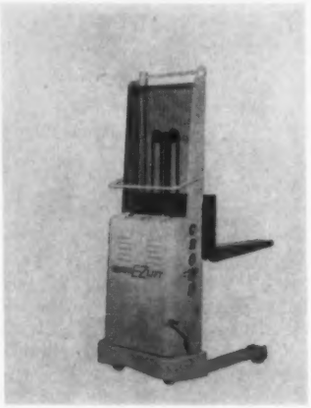
CIRCLE NO. 12, PAGE 7-8

Pyrometer is self-contained and direct reading. Compares and balances or blends brightness of the hot body

with that of a calibrated electric lamp by means of photoscreenic wedges. Calibrated from 1400 F. *Pyrometer Instrument Co., Inc.*

CIRCLE NO. 13, PAGE 7-8

fork lift truck Electrically-operated hydraulic lift Model BL1250-56 has 1250 lb capacity fork lift.



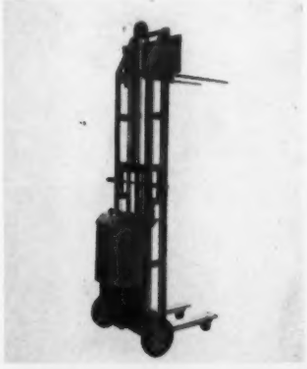
Uses 12-v system with built-in battery charger. Lifts up to 56 in. *Crown Controls Co., Inc.*

CIRCLE NO. 14, PAGE 7-8

Steel hardening compound is said to harden surfaces in minutes by merely adding coat of paste prior to heating. Claimed to have no toxic fumes and no cyanide. *Armor-Tuf Sales Corp.*

CIRCLE NO. 15, PAGE 7-8

fork lift truck Electric-hydraulic lift truck has 1250 lb capacity. Either pedal or battery-powered



models available. Designed for work in close-quarters. 16 models. *Portable Lift Trucks, Inc.*

CIRCLE NO. 16, PAGE 7-8

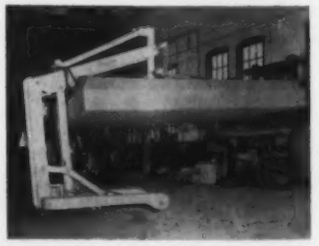
Gas burner provides large radiant heat surface and high rate of heat transfer without flame impingement. Uses any commercial fuel gas, mixes air and gas in stainless steel nozzle outlet. Need for baffle walls or muffles

is said to be often eliminated as well as fire checks. *Hauck Mfg. Co.*
CIRCLE NO. 17, PAGE 7-8

Patternmakers' lathe, No. 20, has belted drive and 4-speed transmission. For wood and light metals. Comes in four sizes to swing 16, 20,

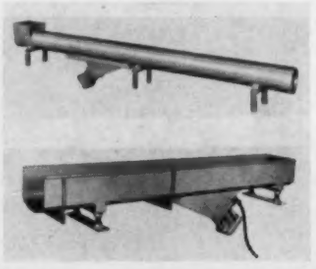
24 and 30-in. power or hand-feeding carriages. *Oliver Machinery Co.*
CIRCLE NO. 18, PAGE 7-8

Fork lift truck **Light weight** fork lift, electrically powered, eliminates counter-weight. Compensat-



ing column maintains straight line travel keeping load moment constant at all positions of lift. Comes in two models, capacity to 4000 lb. *Autoquip Corp.*
CIRCLE NO. 19, PAGE 7-8

Vibrating feeder uses force generated by a pneumatic drive mechanism. Frequency of vibration varied by air



pressure from 30 to 90 psi. Feeder is completely metallic and handles high temperature and corrosive media. *Cleveland Vibrator Co.*
CIRCLE NO. 20, PAGE 7-8

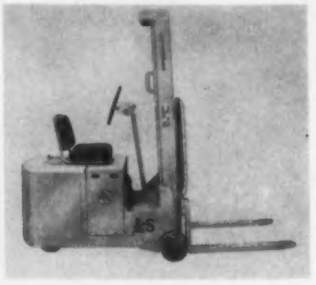
Metal surface preparing hand tool weighs 2½-lb, removes paint, mill

CIRCLE NO. 147, PAGE 7-8

scale and rust for repainting surfaces. *Roto-Scraper Co.*

CIRCLE NO. 21, PAGE 7-8

fork lift truck **Electric fork** truck Model JFTT-2.5 has 2500 lb capacity at 48-in. load length with turning radius of 56-in. Hydraulic



system gives lift speed of 25 ft per min loaded. Uses 24-volt electric system. *Lewis-Shepard Products, Inc.*

CIRCLE NO. 22, PAGE 7-8

fork lift truck **Simplified** hoisting mechanisms featured on Models 730 and 830 having 7000 lb and 8000 lb capacities. Compactness of

mast brings vertical face at base of fork nearer to center line of drive wheels. Lifts for both models tilt 4 degrees forward and 10 degrees back. *Mercury Mfg. Co.*

CIRCLE NO. 23, PAGE 7-8

Multiple-head, conveyor-type abrasive belt grinder line has models with two to six heads, conveyorized

through-feed which permits multiple grinding operations. Designed for wet or dry grinding and finishing of flat-surfaces on high-volume basis. Two-head model handles 3600 small parts hourly. *Engelberg Huller Co.*

CIRCLE NO. 24, PAGE 7-8

Plastic fume ducts and hoods for foundry application are corrosion resistant, dampen sound and withstand temperatures to 300 F. They have high degree of resistance to acids, alkalis and solvents and tensile strength of 15,000 psi. May be made to any shape, light weight makes installation easy. *Ceilcote Co., Inc.*

CIRCLE NO. 25, PAGE 7-8

fork lift truck Compact fork lift truck "460" series has 4000 lb capacity, available with gasoline, LP-gas or diesel engines. Measures 6½ ft long, 3 ft wide. Lifts 4000 lb load 9 ft in under 15 sec. *Towmotor Corp.*

CIRCLE NO. 26, PAGE 7-8

Electric "over-the-floor" extension cord for foundry offices lays flat on floor, no tools required for installation. Withstands foot and caster wear. Made of pure rubber, rated at 15 amps 125 volts. *C.M.G. Industries, Inc.*

CIRCLE NO. 27, PAGE 7-8

fork lift truck Electric, 6000 lb capacity fork truck has hydraulic lift and brakes. Hoist speeds said to be fastest for model of this type: raises 20 ft per min with full load, lowers at 40 feet per min. Features 4 speed magnetic control with time delay between speeds, deadman control included. *Elwell-Parker Electric Co.*

CIRCLE NO. 28, PAGE 7-8

Sound control panels made of steel to reduce sound transmission and fibre glass for sound absorbent qualities. Come in variety of prefabricated sizes, designed for full or partial enclosures. *Rysdon Products Co.*

CIRCLE NO. 29, PAGE 7-8

fork lift truck Gas-powered, pneumatic-tired fork lift truck Model FGF-40, 4000 lb capacity, features 79 in. turning radius. Has loaded travel speed of 9.5 mph, hydraulic brakes, two speeds forward and reverse. *Baker-Raulang Co.*

CIRCLE NO. 30, PAGE 7-8

Hydraulic lift platform designed for plants without loading docks. Installation made in shallow pit. Platforms either square or circular; switch raises, lowers or holds load in any position. Has standard speed of 1 in. per sec. *Hydro-Lift Co.*

CIRCLE NO. 31, PAGE 7-8

Industrial gloves for abrasion resistance feature seamless palm and full

CIRCLE NO. 149, PAGE 7-8

leather wing thumb, claim to have longer wear. Available in cuff, gauntlet and knit-wrist patterns. *Wearhide Glove Co.*

CIRCLE NO. 32, PAGE 7-8

Concrete floor patching compound is said to give five times wear of standard concrete with compressive strength of 10,000 psi. Resists oil, grease, acids and strong cleaning compounds. *Maintenance Engineering Co.*

CIRCLE NO. 33, PAGE 7-8

Laboratory crushing machine handles 600 to 2000 lb hourly, 2 models, built to specifications. Most reduction done on manganese steel breaker and grinding plates in front of grinding chamber. *American Pulverizer Co.*

CIRCLE NO. 34, PAGE 7-8

Tumbler for small parts adapted from concrete mixer, has 7 cu ft capacity. Cleans, smoothes and polishes 500 lb lots for Harper Mfg. Co., Maumee, Ohio, using finely ground corncobs to speed cleaning and polishing. Said to cost under $400. *Speed King Mfg. Co.*

CIRCLE NO. 35, PAGE 7-8

Portable work-station fan designed for dissipating hot air and fumes. Blast directed either up or down in 90 degree arc. Available in 24 to 48 in. sizes with two, four, six or eight blades. *Detroit Blower Corp.*

CIRCLE NO. 36, PAGE 7-8

fork lift truck **Gasoline** operated fork truck Model LT-56 has 6000 lb capacity, outside turning radius of 96 in. and travels up to 9 mph. Two speeds in both forward and reverse. *Towmotor Corp.*

CIRCLE NO. 37, PAGE 7-8

Wet-cutting abrasive blade for masonry work cuts dusting. Comes in several specifications in 14-in. diameters, can be used on all makes of wet-cutting masonry saws. *Eveready Bricksaw Co.*

CIRCLE NO. 38, PAGE 7-8

Brinell hardness tester, automatic, for production work accepts or rejects parts up to 1000 hourly. Machine grinds test surface, applies load, measures depth of impression and accepts or rejects automatically. *Tinius Olsen Testing Machine Co.*

CIRCLE NO. 39, PAGE 7-8

Roof ventilators blow air in rather than out, designed for buildings with inadequate ventilation or with neg-

CIRCLE NO. 149, PAGE 7-8

ative head of interior air pressure due to high volume exhausting. Available in five sizes, 1310 to 11,880 cfm. *Ilg Electric Ventilating Co.*

CIRCLE NO. 40, PAGE 7-8

fork lift truck Heavy-duty lift truck Model 70 has 7000 lb capacity, designed for work in confined areas, may be worked inside a single-

door boxcar. Has 106-in. length with 100 in. turning radius. *Hyster Co.*

CIRCLE NO. 41, PAGE 7-8

Air hammer muffle cover is said to reduce noise intensity up to 55 per cent. Cover consists of double-jacket of sound-proofing material that fits around paving breaker. *Thor Power Tool Co.*

CIRCLE NO. 42, PAGE 7-8

fork lift truck Power brakes and power steering are featured on 8000 lb capacity, pneumatic tire fork lift truck Model 8024. Has four speeds in each direction, travels 16½

mph forward, climbs 21 per cent grade loaded. Powered by 6-cylinder gas engine. *Clark Equipment Co.*

CIRCLE NO. 43, PAGE 7-8

Cleats for conveyor belts may be applied to standard belts, used to prevent materials from slipping back.

CIRCLE NO. 151, PAGE 7-8

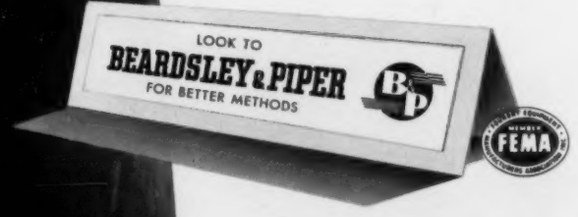
STILL ANOTHER MALLEABLE FOUNDRY GOES SPEEDMULLOR

...a batch of fluffy, flowable, cooled sand every 85 seconds

Iowa Malleable at Fairfield, Iowa, that state's only malleable jobbing foundry, has installed a new Model "70A" Speedmullor to prepare all of their synthetic molding sand. The new unit prepares from 275 to 300 tons of synthetic sand in a 6 to 7 hour day to keep 32 molders supplied. Benefits include not only higher production but improved sand quality and far better control over sand properties. The unit, equipped with Speedmullor Cooling, is an important step in this foundry's progress.

A four-screen portage sand of 67 average grain fineness is prepared in the mullor with minimum additions. The moisture is held to four per cent, and a green strength of 8 p.s.i., and permeability of 90 are obtained in a 60-second mulling and cooling cycle. Speedmullor Cooling is important because the sand is returned to the mullor directly from the shakeout at very high temperatures. A fluffy, flowable batch is discharged from the mullor every 85 seconds ready for molding. No further preparation or aeration is required with the Speedmullor. Write now for full information — Beardsley & Piper, Div. Pettibone Mulliken Corp., 2424 N. Cicero Ave., Chicago 39, Ill.

THE WORLD'S FOREMOST DEVELOPER OF FOUNDRY MACHINERY



NEED A JOLT ROLLOVER *with automatic clamping?*

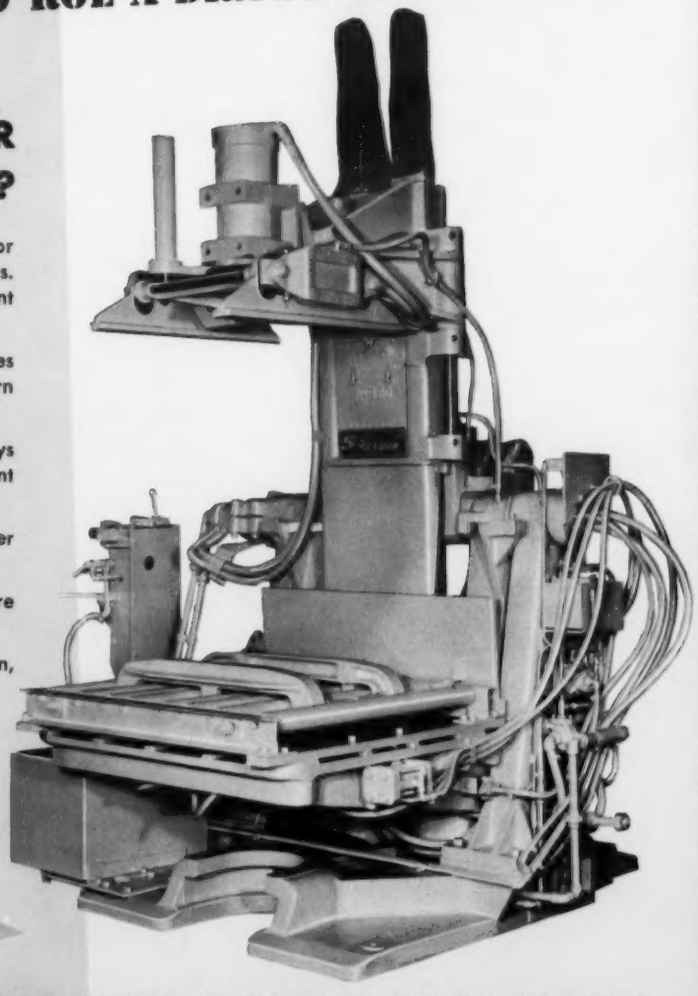
- ✔ New "T" slot table clamps . . . perfect for clamping core boxes or pattern boards on jolt rollover applications . . . top flexibility with instant adjustment to all sizes within range of machine.
- ✔ Automatic flask and core box equalizer is standard equipment . . . provides smooth, accurate draw despite core box or pattern board irregularities.
- ✔ Automatic flask height adjustment provides clamping for any height core box or flask within range of machine. Exclusive dual cylinder adjustment.
- ✔ Automatic push-button rollover cycle provides a fast, smooth, no-delay rollover everytime.
- ✔ No pits for installation . . . just one of many money-saving features.

NOW B&P FLOOR-MOUNTED ROL-A-DRAWS OFFER BOTH!

NEED A ROLLOVER *with automatic clamping?*

- ✔ Automatic, conveyor mounted clamp is ideal for multiple-station molding and coremaking installations. Provides instant clamping for a wide range of different patterns and core boxes.
- ✔ Automatic flask and core box equalizer — eliminates defective molds and cores caused by uneven pattern boards or core boxes.
- ✔ Automatic flask height adjustment — eliminates delays when many different jobs are run. Provides instant clamping of different height boxes and flasks.
- ✔ Push-button rollover cycle for a fast, smooth rollover everytime in minimum time.
- ✔ No pits for installation — an important B & P feature to make installation easier and far less costly.

Beardsley & Piper, Div. Pettibone Mulliken Corporation,
2424 North Cicero Avenue, Chicago 39, Illinois



THE WORLD'S FOREMOST DEVELOPER OF FOUNDRY MACHINERY

Comes in four heights and 36-in. lengths. *Flexible Steel Lacing Co.*

CIRCLE NO. 44, PAGE 7-8

fork lift truck Light-weight fork lift truck, lifts 1000 lb to 60 in. Has dual lifting chains and 12-v electrical system. Operates in 6-ft

aisles. Steering handle locks back into place when released. *Uhrden, Inc.*

CIRCLE NO. 45, PAGE 7-8

Step ladders have eight to twelve steps with locking feature that raises casters and lowers front legs of ladders locking them to the floor. Lock is engaged by foot pressure. Ladders have protective railing at sides and top. *Tri-Metal Ladder Co.*

CIRCLE NO. 46, PAGE 7-8

Die casting removing tool comes in several lengths. Has cone-shaped head, is said to have excellent hold-

ing power on tapered sprues. Allows operator to avoid danger of burning or crushing. *Osborn Mfg. Corp.*

CIRCLE NO. 47, PAGE 7-8

Load lifter comes in three capacities to 6 ton, lightweight makes hook-ups easy. Double interlock prevents

CIRCLE NO. 151, PAGE 7-8

brake from slipping, automatic notch-per-cycle letdown gives positive control. *Wright Hoist Div., American Chain & Cable Co.*

CIRCLE NO. 48, PAGE 7-8

fork lift truck Air-cooled engine powers Model QC, a 2000 lb capacity lift truck with a 4-cylinder air-cooled engine. Features

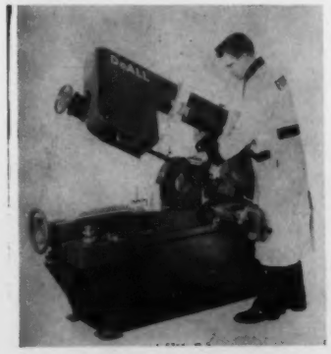
constant mesh transmission, LP-gas is optional, attachments include load-grabs, boom and scoop. *Hyster Co.*

CIRCLE NO. 49, PAGE 7-8

Digital indicating instrument permits direct reading of signals for application in measurement of temperature, pressure, load, speed flow or other variables which can be translated into an electrical quantity. *Performance Measurements Co.*

CIRCLE NO. 50, PAGE 7-8

Power saw, heavy duty designed for cut-off work has 12 x 12 in. capacity. Cuts 5-in. mild steel round under 2 min., 5-min for 3½-in. square of 18-8 stainless. Powered by 1½ hp mo-



tor through four step cone pulleys giving surface speeds of 90, 125, 180 and 250 fmp. *DoAll Co.*

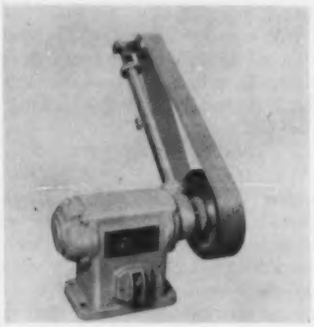
CIRCLE NO. 51, PAGE 7-8

Gas heater, direct-fired, combines both fan and mixing chamber in one unit for use as oven heater or make-up heater in foundry area where processes require large exhaust loads. Lost air is replaced with heated air,

temperature controlled regardless of outside weather conditions. *David-Ludwig Co.*

CIRCLE NO. 52, PAGE 7-8

Abrasive belt bench grinder for grinding, polishing and deburring operates on single or three phase cur-



rent. The 6-in. diameter, 2-in. wide contact wheel is driven by 0.6 hp motor. Belt is 2-in. wide, 48-in. long. *Curtis Machine Div., Carborundum Co.*

CIRCLE NO. 53, PAGE 7-8

Dryer for granular material without loss of fines features a concentric fire-tube design which causes gases to travel length of dryer before contacting the feed. This is said to prevent direct flame impingement and allows indirect heating by radiant means with direct heating by hot gases only. System maintained under a slight negative pressure by seals and positive displacement feeder. *Carpco Mfg. Co.*

CIRCLE NO. 54, PAGE 7-8

Chip cart features a lowered bin-type side allowing turnings to be raked in easily. Handles up to 500 lb. Comes in two capacities, 6.9 and 8.7 cu ft. Removable handle used at either end for convenient maneuvering. Made of 12-gage steel with reinforced loading and dumping lip and fully welded seams. *Coolant Equipment Corp.*

CIRCLE NO. 55, PAGE 7-8

Resinoid bonded snagging wheels from aluminum oxide abrasive are said to have superior qualities in snagging operations due to smaller crystaline structure which give resistance to fracture and sharper cutting edges. *Simonds Abrasive Co.*

CIRCLE NO. 56, PAGE 7-8

Wet-type ventilated grinding bench is said to have increased efficiency in removing abrasive fumes, dust and particles. A self-contained unit with

CIRCLE NO. 154, PAGE 7-8

tank for re-circulating water and sludge disposal. In addition there is a recirculating pump, exhaust fan, hardwood grating work surface and air-washing chamber. *Zack Co.*

CIRCLE NO. 57, PAGE 7-8

Snagging grinders feature infinitely variable speeds; proper peripheral speed selected by turning handle. Twin grinder allows each operator to work independently with different diameter wheels. Also available as single grinder. *Standard Electrical Tool Co.*

CIRCLE NO. 58, PAGE 7-8

Boring mill incorporates system of optical coordinate settings for greater accuracy. Projection screens are fitted to vertical adjustment of spindle slide and boring stay and the transverse movement of the table. Available in three sizes. *British Industries Corp.*

CIRCLE NO. 59, PAGE 7-8

Going to Stockholm?

American foundrymen planning to attend the 1957 International Foundry Congress to be held at Stockholm, Sweden, August 19-24, are requested to contact the American Foundrymen's Society.

The Swedish Foundrymen's Association has arranged sightseeing in the beautiful Scandanavian countries, a program of papers on technical foundry practice, plant visits in Sweden, Norway, Finland and Denmark, and a ladies program.

A unique feature of this International will be two one-day "Study Tours" on August 20 and 22, Specifically arranged to visit outstanding steel, iron and non-ferrous foundries in Sweden and Finland. In addition arrangements have been made with a large number of foundries in Sweden, Denmark and Norway to receive visitors.

The Finnish Metals Association has arranged a post-Congress tour to Finland, August 21-27.

AFS is anxious to learn as soon as possible the names of any American foundrymen planning to attend the International in Sweden. Lars Villner, General Secretary of the Swedish Foundrymen's Association, states that it is essential to make hotel reservations in Stockholm not later than the latter part of April.

Foundrymen going to Stockholm should advise the AFS General Manager immediately at AFS Headquarters, Des Plaines, Illinois. Details on the program and plant visits will be published in the May issue of MODERN CASTINGS.

the editor's field report

by Jack Salzman

◗ **Vol. 1—No. 1:** This designation always marks the beginning of a new magazine. And believe me to start a new magazine in this day and age requires more than an ambitious publisher, a hungry editor and a third martini. Consequently our hats are off to the Institute of British Foundrymen for taking the bold step that now makes them publisher of a new magazine named *The British Foundryman.* This monthly publication will be the British counterpart of our own MODERN CASTINGS (formerly *American Foundryman*) serving the members of the British equivalent of AFS. Best wishes for success are extended to the new Editor, George Lambert, who is also the Secretary of IBF. Just as there has been long standing cooperation between AFS and IBF we look forward to many years of pleasant relations between The *British Foundryman* and MODERN CASTINGS.

◗ **Signs of Safety:** "852,300 man-hours without a lost-time accident and still going strong on Feb. 22, 1957." Where? In the Foundry Pattern Shop of American Cast Iron Pipe Co., Birmingham, Ala. Let the Editor know if your shop can top this record.

◗ **Casting Through the Ages:** In case you are an admirer of this department in MODERN CASTINGS you will be interested to learn that we have a number of the original drawings for Casting Through the Ages available for-the-asking. If you would like one of these pen and ink sketches to decorate a wall just write a request to the Editor and an original work-of-art will be yours.

◗ **CO_2 Speeds Hardening of Cement-Bonded Sand:** Since the use of cement as a binder for molding sands originated in Holland as the Randupson Process, it seems fitting to learn that the Dutch have discovered that CO_2 gas can be used to accelerate mold hardening. Gassing of cement-bonded cores for six minutes develops strength that normally requires 15 hours. The principle advantage comes from the increased production of cores attainable from core boxes which were formerly tied-up for many hours waiting for the cement to develop enough strength to permit handling of cores. Details of the process are fully described in this April issue of MODERN CASTINGS.

◗ **Did You Know:** That LP gas sales jumped 16.7 per cent in 1956 over 1955? Big assist came from the growing use of this fuel for industrial fork-lift trucks. Don't miss "Fork Lift Truck—First Step in Mechanization," in this April issue of MODERN CASTINGS!

◗ **"Silent" Sound Performs Miracles:** Inaudible sound waves, above 18,000 cycles per second, are performing amazing feats for industry. Better known as "ultrasonics", this new tool of industry is performing a myriad of amazing deeds. For instance ultrasonics is being used to drill square holes in diamonds and other hard materials, clean and degrease materials, sterilize surgical instruments, decontaminate radioactive objects, solder aluminum and magnesium without a flux, detect cracks or internal holes in metals, measure the thickness of metals, degas liquids, dye fabrics, sense liquid levels, ferment beer, detect tumors, treat arthritis, remotely control TV, and in this issue of MODERN CASTINGS *ultrasonics adds strength to cast metals.*

◗ **Foundry Ingenuity:** I wonder how much time is spent in foundries trying to get a safe and sane hold on a casting with a cable or chain so it can be moved by crane? Did you ever wish a casting had handles on it? I couldn't help noticing how the Dodge Foundry of Chrysler Corp. in Detroit solved this irksome problem and speeded the handling of gray iron castings from shakeout through cleaning. Toggles are cast right on the casting in a location that makes it easy for the shakeout man to quickly slip into it the hook on the end of the conveyor chain. This "handle" facilitates safe handling throughout the subsequent plant operations. When the finished casting is ready to leave the foundry a hammer blow deftly removes this extra appendage. Easy wasn't it?

let's get personal

Harold R. Kohl . . has been named manager of manufacturing engineering for General Electric Co.'s Erie foundries. Kohl's previous position was at the firm's Elmira, N. Y., foundries.

A. D. Matheson

A. D. Matheson . . has retired as general manager, French & Hecht Div., Kelsey-Hayes Wheel Co., Davenport, Iowa. Matheson, a past director of AFS, will continue to reside in Davenport.

Hiram Brown

Hiram Brown . . has been promoted from chief metallurgist to technical advisor to the plant manager at Solar Aircraft Co.'s Des Moines plant.

Central Foundry Division, General Motors Corp., has named **Thomas J. Karnosky** as auditor. **William G. Arnholt** will succeed Karnosky as resident comptroller at the Saginaw Malleable Iron plant.

Frank G. Faller . . has retired after nearly 40 years as an expert in foundry practice for Corn Products

F. G. Faller

Sales Co. He was active in the development of the company's foundry products.

Charles E. Pretzinger . . has been appointed Pacific Coast district manager of Pangborn Corp., Hagerstown, Md. Pretzinger will direct Pacific Coast operations from his Pasadena, Calif., headquarters.

C. E. Pretzinger

L. R. Jenkins . . plant metallurgist, Wagner Malleable Iron Co., Decatur,

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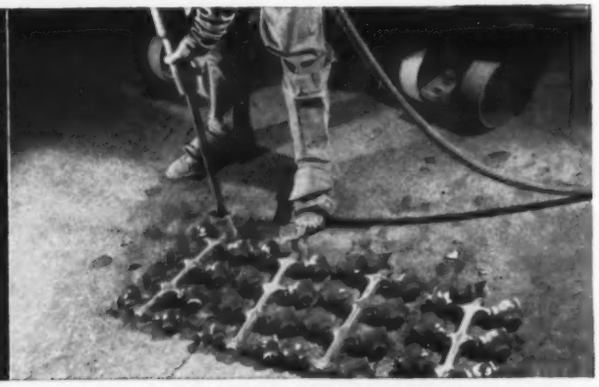
WE TAKE CARE OF ALL SIZES

Whether your ferro-alloy requirements be a barge load or drum, lump size or crushed, we are prepared to supply your needs.

Ohio Ferro-Alloys Corporation
Canton, Ohio

costly steps you can bypass

● No oven drying is necessary



● No core knock-out problem

● No reinforcing with wires and nails

● No patching operations

. . . with shell cores bonded with DUREZ 18250 RESIN

SHARPLY REDUCED COSTS in mass production of high-grade castings result from simpler procedures made possible by Durez 18250 phenolic resin for cold coating sand.

Operations started in a corner soon mushroom into profit-making business, crying for extra space.

This is what happened at the Marsh Valve Company, Dunkirk, New York. Labor and material costs were reduced and production rate was increased. Core driers and conventional oven baking operations were eliminated. Core setting was faster. Breakage due to handling was negligible. Wire or nail reinforcing and patching were no longer necessary. The shell cores were much lighter in weight; for example, one valve body core made with conventional core sand weighed 9 oz. versus 4 oz. for a corresponding shell core. Considerable savings were also evident in a faster and cleaner shell core shake-out.

Shells and cores bonded with Durez 18250 have good hot and cold strength. More economical resin-to-sand ratios can be used, while the fast cure of the resin means shorter production cycles. Resultant castings exhibit pattern-like surfaces with clean, sharp edges.

Order a trial shipment today, and let us show you how Durez 18250 cuts costly steps.

We will gladly send you our authoritative 16-page booklet covering simplified procedure, coating methods, solvents, test methods, etc. Ask for the "Durez Guide to Resin Coated Sand."

DUREZ®

Phenolic Resins that Fit the Job

DUREZ PLASTICS DIVISION

HOOKER ELECTROCHEMICAL COMPANY

1904 WALCK ROAD, NORTH TONAWANDA, N. Y.

HOOKER CHEMICALS PLASTICS

Ill., has been elected vice-chairman of the AFS Controlled Annealing Committee.

W. A. Hunter . . has been appointed project and development engineer by the Beardsley & Piper division of

W. A. Hunter

Pettibone Mulliken Corp. He was formerly foundry equipment engineer at Dominion Engineering Works, Montreal.

Aluminum Co. of America has announced a series of organizational changes resulting from the incorporation of its castings division operations into the firm's fabricating division. **John H. Alden** has been named an assistant chief metallurgist to coordinate developmental activities. Assistant chief metallurgist **John W. Hood** assumes the additional duty of coordinating control activities. **Howard J. Rowe** has been named chief metallurgist, and **Sanford H. Bennett** has been appointed chief industrial engineer.

L. C. Hewitt

L. C. Hewitt . . has been elected vice-president for research and development of the Ironton Fire Brick Co., Ironton, Ohio.

Arlington Bronze and Aluminum Corp., Baltimore, Md., has announced

CIRCLE NO. 159, PAGE 7-8

that **H. D. Hammond** has been elected to the board of directors and named vice president-sales. **G. A. D'Andrea,** assistant foundry superintendent, was also elected to the board.

Gerotor May Corp. has announced the appointment of **Elmer J. Boehs** as general sales manager and **Horace A. Sevier** as chief engineer.

J. J. Manzella

Reading Gray Iron Castings, Inc., Reading, Pa., has named **Joseph J. Manzella** as plant and production manager. **Rex Harrison** has been appointed sales manager for the firm.

Raymond L. Purcell . . has been named vice-president in charge of foundry sales at Oberdorfer Foundries Inc., Syracuse, N. Y.

Arthur J. Buckley . . has been promoted to general sales manager of the Pangborn Corp., Hagerstown, Md.

Rex Harrison

Wellman Bronze and Aluminum Co., Cleveland, has announced three executive changes: **Paul W. Hook** has been named executive vice-president and treasurer; **Glenn F. Ihrig** is now vice-president in charge of sales; **Gene Faubel** is now assistant sales manager.

Theodore Fields . . has been named to the AFS Radiation Protection Committee. Fields is a Fellow of the

American College of Radiologists and is a Certified Medical Nuclear Physicist.

Mellor W. Stevenson . . has been named general manager-sales for the railway division of National Malleable and Steel Castings Co., Cleveland.

Danko Pattern and Mfg. Co., Inc., Baltimore, Md., has announced the election of **Bert B. Bevans** as vice-president-production and **Norbert J. Hynson** as treasurer. **F. C. Weegar,** manager of the firm's metal department, has been elected to the board of directors.

Howard C. Holmes . . Kaiser Aluminum and Chemical Sales, Inc., executive has been named director of the Aluminum and Magnesium Division of the Business and Defense Services Administration, U. S. Department of Commerce.

C. W. Gilchrist . . has been promoted from foundry superintendent to assistant works manager for Cooper-Bessemer Corp., Mt. Vernon, Ohio.

Robert V. Guigonon . . has been named a sales representative for Gries Reproducer Corp., New Rochelle, N. Y.

Bernard N. Ames . . president of Columbian Bronze Corp., Freeport, N. Y., has been elected to the board of directors of John B. Salterini Co., Inc.

Arthur K. Watson . . president of IBM World Trade Corp. has been elected to the board of directors of American Brake Shoe Co.

George Champion . . president of Chase Manhattan Bank, has been elected to the board of directors of American Smelting and Refining Co.

L. J. Pedicini . . staff engineer, General Motors Corp. process development section, has been elected vice-chairman of the AFS Sand Division.

Robert A. Laws . . has been named manager of sales engineering for Baker-Raulang Co., Cleveland materials-handling equipment manufacturer.

W. J. Hammond . . has been elected assistant secretary and director of Claud S. Gordon Co. Hammond is chief application engineer for temperature control equipment, furnaces and ovens, and metallurgical testing machines.

Arthur Hoffheimer, Jr. . . has returned to his post as vice-president

of Buckeye Products Co., Cincinnati, after a two year leave of absence due to illness in his family. He will serve as sales manager of the company's foundry division.

George P. Woodward . . has been named manager of the Philadelphia district sales office of Archer-Daniels-Midland Co.

Robert D. McWhorter . . has been made sales representative for Mexico Refractories Co. in Birmingham, Ala.

Walter Holcroft . . executive vice-president of the Holcroft Co., Detroit, has been elected president of the Industrial Heating Equipment Assn.

James Patrick Godfrey . . has been named district representative for Erie Strayer in the southeastern territory. His headquarters will be Decatur, Ga.

Electro Metallurgical Co. has announced the appointment of three sales engineers: **H. B. Parfet, Jr.**, **R. J. Kelly**, and **E. F. Helminiak**.

Joseph D. Allen, Jr. . . has been appointed chief technical sales engineer for the eastern district of Federated Metals Division, American Smelting and Refining Co.

Dr. G. V. Kingsley . . has been named director of research for Bohn Aluminum and Brass Corp.

Syntron Co., Homer City, Pa., has named two new sales personnel for its vibratory handling equipment: **R. E. Dunfield** in Connecticut and **F. G. Flesche, Jr.**, in New Jersey.

Germans Receive AFS Books

Seven technical books have been donated by the American Foundrymen's Society to Verein Deutscher Giessereifachleute, the German technical foundry society. The books were exhibited at the International Foundry Congress and associated International Foundry Trade Fair at Dusseldorf, Germany, in September, 1956. Included the AFS *"Glossary of Foundry Terms," Foundry Core Practice," "Principles of Metal Casting," "Processing Molding Sands," "The Cupola and Its Operation," "Engineering Manual for Control of In-Plant Environment in Foundries"* and *Time and Motion Study for the Foundry."*

CIRCLE NO. 163, PAGE 7-8

Revised AFS Cast Metals Handbook Available Soon

Completely revised, the fourth edition of the American Foundrymen's Society's *Cast Metals Handbook* will soon be off the press. More than 2000 copies have been sold in advanee of publication. The third edition had sales in excess of 10,000 copies.

The book includes data on the latest developments in the cast metals field and contains six chapters and 41 sections ranging from advantages of castings to metallurgical properties.

Revision of the handbook was supervised by the AFS Cast Metals Handbook Revision Committee composed of Hyman Bornstein, chairman, retired; C. E. Sims, Battelle Memorial Institute, Columbus, Ohio; and Dr. R. F. Thompson, Metallurgical Engineering Department Research Laboratories Div., General Motors Corp., Detroit, Mich.

The book is composed of the following:

Design and specifications: advantages of castings, properties of cast metals; information for designers and buyers of castings; casting design; patterns; cost information; lists of specifications; listing of technical societies, trade associations and governmental agencies; significance of mechanical testing; molding methods; and inspection methods.

Gray and white cast metals: general information; methods of manufacture; metallurgy of cast iron; properties of cast iron; classification and specifications; heat treatment; white and chilled iron castings; applications and bibliography.

Malleable cast iron: general information; metallurgy; methods of manufacture; properties; and pearlitic malleable iron.

Nodular cast iron.

Steel castings: general information; methods of manufacture; metallurgy; feeding, properties, specifications; applications; and bibliography.

Non-ferrous castings: aluminum base alloys; copper base alloys; magnesium base alloys; lead base alloys, nickel base alloys; tin base alloys; titanium base alloys; and zinc base alloys.

Preprints of technical papers to be presented at the AFS 61st Castings Congress at Cincinnati May 6-10 are listed by number in the program section of the April MODERN CASTINGS. They are available at nominal cost from the AFS book department, Golf and Wolf Rds., Des Plaines, Ill.

CIRCLE NO. 163, PAGE 7-8

Coremaker cures larger core with portable CO_2 unit, using 50-lb. pressure. Cores are firm, easy to handle.

Cured cores ready to be taken to the metal pouring lines. Specially prepared core sand feeds through chute (left). Sand is hand-tamped into molds. Then CO_2 from jet (center) is shot into molds.

AFS Board of Directors Names Slichter and Drury

Charles E. Drury, plant manager, Central Foundry Div., GMC, Danville, Ill., is now serving as a national director of the American Foundrymen's Society. He was appointed at the February meeting of the Board of Directors to serve the unexpired term of R. V. Righter, former manager, Central Foundry Div., GMC, Danville, Ill. Drury, a graduate of the University of Illinois and the first president of the Student Chapter at the University, represents Gray Iron and Malleable (Chapter Group J—Central Indiana Chapter). His term expires in 1959.

The Board also named Allen M. Slichter, president and general manager, Pelton Steel Casting Co., Milwaukee, as a national director. He was appointed to serve a three-year term as the director appointed annually by the Board. His term will start following the annual meeting of the Board of Directors to be held May 8, 1957 at the AFS 61st Casting Congress in Cincinnati.

WOOL GATHERING

The molder rams his sand and dreams.
He ponders on the hunt; of gunning
In thick green woods where deer are running
And trout lurk deep in swift cold streams.

The grinder's musings vaguely roam
To a garden patch—to sowing, hoeing;
To a fertile lawn where grass needs mowing;
To endless chores about his home.

The pedant coreman slicks his core;
But his abstraction, undivided,
Is with a family reunited;
A grandchild creeping on the floor.

The typist pert, illuminates
In fancy's eye, a crowded room;
Flowers, friends, a bride and groom.
She types and types and ruminates.

Sometimes while at my work, I feel—
With furnace roaring, rammers drumming,
Sirens blowing, motors humming—
The job's a dream, and dreams are real.

■ From *The Foundry Bard*, a column of foundry poems appearing in *The ESCO Ladle* of the Electric Steel Foundry Co., Portland, Ore. Bill Walkins, former sand mill operator, is both the editor of the *Ladle* and the one, and original, Foundry Bard.

pouring off the heat

hoot mon!

■ In the January issue of MODERN CASTINGS you ran my small contribution on Warm Blast Cupolas. In the sub-heading of this article you identify us as an English foundry. I am afraid that if my ancestors hear of us being referred to as an "English" foundry there will be some ominous rumblings in the little grave yards "on the Bonnie Bonnie Banks of Loch Lomond". I hasten to assure you that this is my only criticism. Best wishes for the continued success of MODERN CASTINGS.

WM. Y. BUCHANAN
John Lang & Sons, Ltd.
Johnstone, Renfrewshire

Well, I guess almost everybody knows that Johnstone, Renfrewshire is in Scotland, except me, that is. However I never have forgotten a farmer by the name of Inchamagannachan whom I met on the braes of Loch Lomond.—Editor.

clay or graphite or clay-graphite

■ The December issue of MODERN CASTINGS described on page 19 a hobby kit available for those interested in making non-ferrous castings in their home workshops.

Included in the equipment we noted fire clay crucibles. It is my opinion that the manufacturer selling these kits should offer graphite crucibles because it would be extremely difficult for the amateur to bring fire clay crucibles up to temperature without danger of cracking them.

RICHARD H. STONE
Vesuvius Crucible Co.

I think you're both wrong. For my money I would rather use clay-graphite crucibles.—Editor.

monthly thanks

■ We think the idea of making the January Bonus Section a calendar was excellent. Everyone uses this type of calendar. Congratulations on a job well done.

CLYDE A. SANDERS
American Colloid Co.

MORE FACTS on all products, literature, and services shown in the advertisements and listed in Products & Processes and in For the Asking can be obtained by using the handy Reader Service cards, pages 7-8.

committees in action

The Physical Properties of Iron Foundry Molding Materials at Elevated Temperatures Committee met in Detroit, Jan. 10, with 20 present. A report showing excellent correlation between shock expansion tests and scabbing defects, prepared by H. W. Dietert, was approved for presentation at the 61st Casting Congress. The next study project will be on the subject of veining. Chairman Gitzen appointed a steering committee to plan the work to be accomplished on veining at the next meeting at the University of Wisconsin. The variables to be studied are sands, metals, and patterns.

The Noise Control Committee met in Chicago, Jan. 15, with ten present. A session on foundry noise was scheduled for the 61st Casting Congress. The following chapters for the *Foundry Noise Manual* were approved: Physics of Noise, Legal Aspects of the Noise Problem, and How to Measure Noise. Five other chapters are currently receiving attention. The committee plans to complete the manual in 1957.

The Program and Papers Committee (Sand Division) met in Chicago, Jan. 16, with seven present. Division Chairman Zirzow reported on the status of 17 papers under consideration for presentation at the 61st Castings Congress. The committee reviewed an outline of the keynote address to be given by H. F. Barr, Chief Eng., Chevrolet Motor Div., GMC. A film depicting operations at the Chevrolet foundry was reviewed and scheduled for showing at the Sand Division Dinner. Speakers were selected for the Sand Shop Course on "Sand Control Leads to Quality Through Economy."

The Sand Division Executive Committee met in Chicago, Jan. 17, with 16 present. L. J. Pedicini was elected Vice-Chairman of the Sand Division. E. C. Zirzow reviewed Sand Division plans for the 61st Castings Congress. O. J. Myers was selected to preside over the Sand Division Dinner. Reports were submitted by the various committees. Committee 8-K was merged with 8-G. C. A. Sanders reported that the target date for completion of the *Sand Handbook* is December. A. Jamieson was appointed new chairman of the Canadian Com-

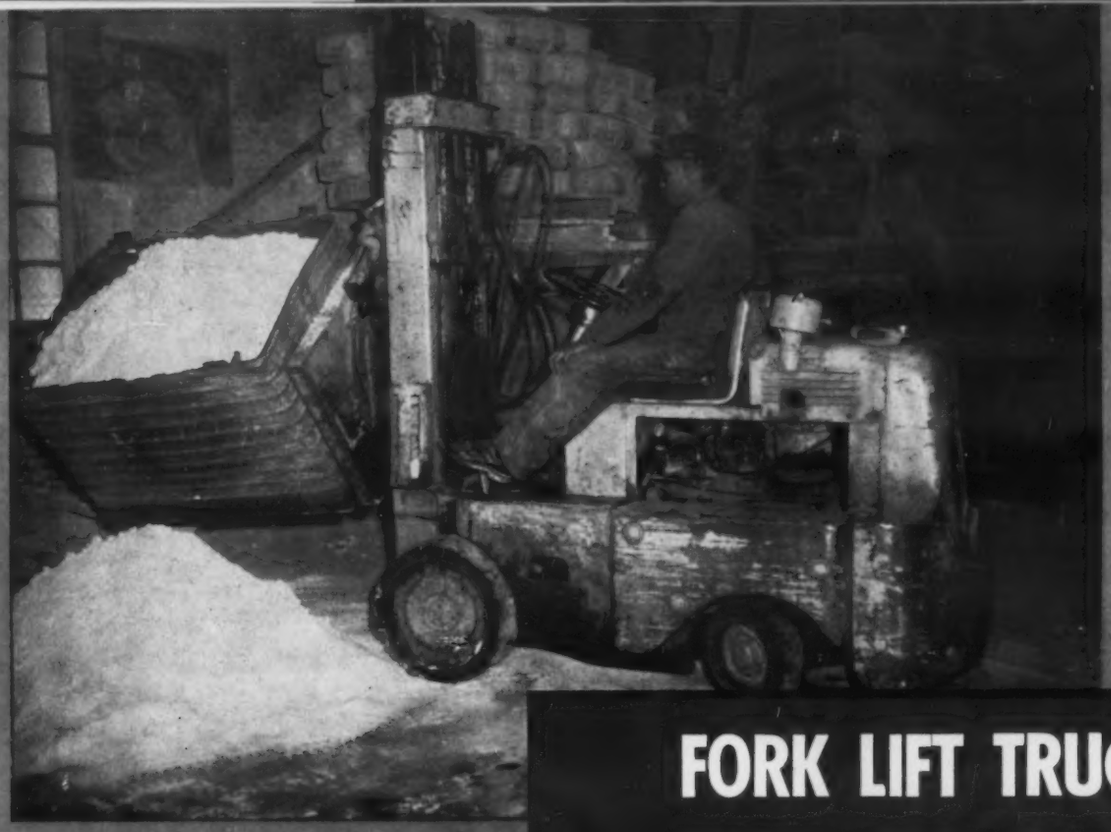
mittee (8-Y). The recommendations of the Reorganization Committee were approved.

The Physical Properties of Steel Foundry Sands at Elevated Temperatures Committee met in Chicago, Jan. 18, with eight present. E. E. Hucke reviewed the work on scabbing being done at Locomotive Finished Materials Co. Results indicated that hard ramming of the mold and mold filling rate substantially affect the tendency to form cope scabs. Members are submitting sand samples to be subjected to confined expansion laboratory tests.

The Gray Iron Division Executive Committee and **Program & Papers Committee** met in Chicago, Jan. 22, with 12 present. H. W. Lownie reported on the status of various papers scheduled for the 61st Castings Congress. It was suggested that the Microstructure of Cast Iron Committee undertake the development of a classification of structures for nodular iron similar to the graphite classification chart for gray iron. H. E. Henderson agreed to prepare an article for publication in MODERN CASTINGS covering work on development of a new test bar for nodular iron.

The Controlled Annealing Committee (Malleable Division) met in Chicago, Jan. 25, with eight present. L. R. Jenkins was elected Vice-Chairman. Final arrangements were discussed for the Malleable Iron Shop Course scheduled for the 61st Castings Congress. The course will cover "Graphitization Theory and Mechanics and Comparison to Other Materials" and "Effects of Chemistry and Melting Conditions on Overall Cycle." Questionnaires have been sent out to obtain information on malleable annealing practices in the industry. To-date 18 plants have replied out of the 27 contacted. Three more questionnaires are being prepared.

The Shell Molding Materials Testing Committee met in New York, Jan. 28, with 16 present. A questionnaire on problems encountered in shell molding was worked into final form for mailing out to a representative group of shell molding foundries. R. A. Rabe reported on his work on the tentative standard test pattern. Following completion of some additional tests he plans to prepare a final report on the findings. J. E. Bolt submitted a draft of the tentative standard tensile strength test for resin coated sand (blown method). I. G. Smillie is preparing a tentative standard test for determining resin content of molding mixes.



By installing a rotating head on a fork lift truck, materials are easily unloaded.

E. O. Spahr / *General Superintendent*
National Malleable and Steel Castings
Company, Indianapolis

MOVING FOUNDRY MATERIALS-No. 1

FORK LIFT TRUCKS: FIRST STEP IN MECHANIZATION

Today it is hard for an employee in the Indianapolis plant of National Malleable & Steel Castings Company to visualize their plant operating without the services of fork lift trucks. Yet only nine years ago foundry materials and castings were moved throughout this plant in wheelbarrows and on four-wheel trucks. Now you almost need a search warrant to even find a wheelbarrow for an odd job. And the four-wheel truck is as dead as a dodo.

This trend toward mechanization started in 1948 with the purchase of our first fork lift motorized truck. Today 12 of these "masters of all materials" are busily moving ingredients, products, and by-products of hundreds of tons of malleable iron production per week throughout the plant on Indianapolis' west side. Of these 12 trucks, one is assigned to the yard for unloading freight, two are in the melting department, two in the foundry, one in grinding, three in cleaning and straightening, one in shipping, and two are in stand-by or undergoing preventive maintenance.

Although great quantities of material and castings are moved through this plant by four miles of continuously-moving overhead chain conveyors (pendulum type), it is the fork truck that lends itself best to changing patterns of production and flow of materials. This flexibility helps modify the rigidity of a mechanized foundry utilizing extensive conveyor systems. In fact, throughout the plant can be seen many examples of how the lift truck has changed material handling and packaging of raw materials received and finished products shipped.

Firebrick for the cupolas and air furnaces now arrive at the plant in box cars loaded with individual pallets measuring 40 in. x 36 in. x 20 in. and holding 450 bricks. One man and his fork lift truck unload this box car in 1-1/2 hours where it formerly took 60-80 man-hours of time to do the job. And don't overlook the added expense of demurrage on the freight car for the days it sat on the siding tying up the unloading platform.

Similar economies are effected in handling the bentonite, sea coal, cereal, and refractory cements. Tons of these materials are quickly lifted out of delivery car or truck, transported to the storeroom, and stacked as high as 8 feet. The lift truck is the in-plant special delivery wagon carrying these materials to the sand preparation or melting departments with the same time-saving ease that brought them into the storeroom.

Molding flasks are moved on pallets from the storage area to the molding department and from shakeout back to storage via "the one-man gang." For convenience of handling, the slag from the cupola and air furnace is run into steel tote boxes and carried away to the dump by one of these versatile four-wheeled work-horses.

After the castings are poured, shaken out, and the gates and risers removed, the fork lift enters into the picture again. The gates and risers, more commonly referred to as "sprue," drop off an apron plate conveyor into steel tote-boxes measuring 3 ft x 4 ft x 3 ft deep and holding about 2000 lb of scrap metal. The boxes are mounted on steel channel irons so the fork can be slid under the box.

One lift truck is assigned to transporting these boxes of sprue out to the scrap yard. This truck has a rotating head attachment that permits the boxes to be inverted, dumping the contents in the scrap storage area. Over 130 tons of sprue are moved during two shifts each day in this manner.

After the gates and risers are removed from the castings the latter are inspected, placed in buckets traveling on the overhead chain conveyor, and travel to the heat treating department. The castings

Loading a truck with castings is no trouble for fork lift.

Molding sand additives are raised to upper level by versatile fork lift.

Delivering sacks of foundry supplies on skids speeds materials handling.

From moving raw material to carrying finished castings, fork lifts service National Malleable's production lines

are removed from the conveyor and packed into the heat treating furnaces. After malleablizing, the castings again travel in buckets via the conveyor to the cleaning and straightening department. Here three lift trucks are kept busy moving many hundred tons of castings per week. Tote boxes and baskets full of castings are trucked from gate removal to cleaning to straightening to the weigh station.

At this latter point the fork lift truck assigned to the shipping room takes over. One man and his maneuverable truck now handle the work formerly requiring three men and their wheelbarrows. If the casting purchaser uses fork trucks he will usually specify that the castings be packed in wooden boxes on skids. These boxes are easily loaded into a truck or box car at the shipping room and just as quickly removed at their destination.

If the customer prefers to handle the castings loose, a tote box of castings is carried into the conveyance and dumped by the rotating head on the lift truck. A word of caution—since fork lift trucks weigh from 3000 to 17,000 lb and can carry from 1500 to 15,000 lb loads—be sure the runways, ramps, and floors on shipping vehicles are strong enough to hold the loads.

Because these "four-wheeled rugged individualists" must be properly cared for, National Malleable has set up a separate maintenance shop to keep them rolling. Preventive maintenance in the form of proper lubrication practices can add from 15 to 20 per cent to truck life. Each truck is provided with a log sheet to record the hours of operation; oil, gas, and water use; comments on mechanical malfunctions; and the operator's name. These records should lead to the proverbial stitch-in-time that prevents major breakdowns.

With fork lift trucks costing from $4000-$7000, as much or more than a new Cadillac, it is important to train competent personnel to handle them. Only operators licensed by the plant are permitted to operate the trucks. The operator drives only the truck assigned to him. The lift trucks are alloted to specific departments and are restricted to operation within them. Serious accidents to person and property can result from unqualified personnel getting behind the wheel of a vehicle as complicated and powerful as a fork lift truck.

As the result of our experiences with fork lift trucks National Malleable firmly believes that expansion without mechanization is uneconomical. One of the biggest single economic influences in producing malleable iron castings is the cost of moving the raw materials through plant operations in a manner that will produce a profitable end product.

The fork lift truck is such a handy tool for a foundry that no one plant can make use of all its tricks. On the next two pages the editors have assembled pictures of trucks at work in other plants.

Additional descriptions of trucks, special equipment and manufacturers' literature are in this issue. New equipment news starts on page 6 and new literature listings on 79.

BIG LIFT IN THE FOUNDRY

Fork lift trucks cut handling costs; increase use of space

Foundries pay a heavy materials handling bill for each ton of finished castings, but in the fork lift truck many have found the answer to many loading, transporting and storage problems. In addition to moving vast amounts of materials, the fork lift trucks make greater use of existing space through high-stacking and through their maneuverability in cramped aisles.

In many instances fork lift trucks have saved the cost of installing overhead materials handling systems; in other cases they have added flexibility to production lines by their ability to move loads quickly and economically. Fork lifts have been successful in all phases of foundry operations. From the loading of raw materials, either palletized or in bulk, through the production lines, heat treating and cleaning operations and to the delivery of castings to trucks or railroad cars. Photographs were assembled through the cooperation of the Materials Handling Institute, Inc.

Foundries' big volume operations lend themselves to fork trucks.

Special attachments increase versatility of fork lift trucks.

LP units have advantages where air is filled with dust.

National Malleable and Steel Castings Co. is using fork lift trucks to perform a number of the jobs pictured here. For that story turn back to pages 34-35.

Many other applications of fork lift trucks as well as descriptions of trucks, special equipment, and manufacturers' literature are contained in this issue. New equipment news starts on page 6 and new literature listings start on 79.

Bulky and heavy materials are handled easily at fraction of cost possible by manual labor.

Ability to supplement other materials handling systems increases their usefullness.

Fork lifts' ability to reach pays off not only in stacking but also in charging of electric furnaces.

Utility of trucks can be increased by modifying to fit special conditions in foundries.

Transporting of dangerous loads with safety are routine for fork lifts.

Fragile loads such as cores may be moved and high-stacked with speed.

AFS COMPLETES PROGRAM FOR CASTINGS CONGRESS

Advance housing registration for 61st Castings Congress indicates record attendance for alternate-year program

"The program of papers to be presented at the Castings Congress in Cincinnati, May 6-10," according to Frank W. Shipley, President of AFS, "offers foundrymen and design engineers an exceptional range of information and value. I believe this is the most progressive program AFS has presented at any Convention in many years.

"Great credit is due the Society's technical divisions and committees in slanting their programs toward the dual interests of the Castings Congress and the Engineered Castings Show. In fact, many of the papers dealing strictly with the metallurgy and production of castings are of primary interest to the designers and users of cast products.

"In effect the Society has actually undertaken two separate Conventions in 1957. In my estimation this will be the first true Castings Congress we have ever sponsored. We anticipate an attendance far greater than at any previous Convention in comparable years."

Housing registration indicates that this year's attendance will be the largest ever for an AFS alternate-year program.

Three featured speakers will outline present and future developments of foundries. The Hoyt Memorial Lecture will be given by Hyman Bornstein whose topic will be *"Progress in Iron Castings."* Bornstein is a past president of AFS and received the McFadden Gold Medal in 1946. He is now retired.

A management development program will be initiated at the Cincinnati meeting. William J. Grede, president, Grede Foundries, Inc., will discuss *"Developing Foundry Management."* This will be followed by a panel discussion of the subject. Harry F. Barr, Chevrolet chief engineer, will present an illustrated talk on *"An Automotive Engineer Views the Foundry,"* discussing future problems facing foundries in competing for the automotive market.

Committees have been announced for the combined Castings Congress and Engineered Castings Show by E. H. King, chairman of the general convention committee.

General convention committee: chairman, E. H. King, Hill & Griffith Co.; vice-chairman, R. J. Westendorf, Dayton Castings Co.; Jesse James, secretary-treasurer, Dayton Oil Co.; Martin Rollman, Cincinnati Milling Machine Co.; Robert Thompson, H. P. Deuscher Co.; Ernest Stockum, G. H. R. Foundry; J. S. Schumacher, Hill & Griffith Co.; Charles Riese, Cincinnati Milling Machine Co.; R. J. Westendorf, Dayton Castings Co.

Plant visitation committee: Martin Rollman, chairman, Cincinnati Milling Co.; Robert Thompson, vice-chairman, H. P. Deuscher Co.; Ernest Stockum, vice-chairman, G. H. R. Foundry; Maurice Bollinger, Wm. Powell Co.; William Oberhelman, Oberhelman Ritter Foundry; James Walther, Dayton Steel Casting Co.; Clifford Morningstar, Black Clawson Co.; Richard R. Deas, Hamilton Foundry & Machine Co.; William Schneble, Advance Foundry Co.

Shop course committee: J. S. Schumacher, co-chairman, Hill & Griffith Co.; William Oakley, co-chairman, Delhi Foundry Sand Co.; Helen Redmond, Buckeye Foundry Co.; Clyde McQuiston, Advance Foundry Co.; David Pusack, Cincinnati Milling Machine Co.; Eugene Brunsman, O. P. W. Corp.

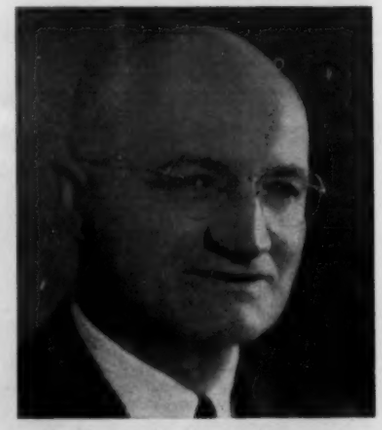
Publicity committee: Roland Schwartz, chairman, H. Kramer Co.; Charles Riese, Cincinnati Milling Machine Co.; Jesse James, Dayton Oil Co.

Banquet committee; Jesse James, chairman, Dayton Oil Co.; Robert Shick, vice-chairman, Ranson & Orr Co.; Arthur Jones, treasurer, Aero Equipment Corp.; Maurice G. Bolinger, William Powell Co.; Hartzel Bovard, Reliance Foundry Co.; William Dine, St. Mary's Foundry; Richard R. Deas, Jr., Hamilton Foundry & Machine Co.; William Gilbert, Jr., Buckeye Foundry Co.; Milton E. Johnston, Whiting Corp.; E. H. King, Hill & Griffith Co.; Charles T. Koehler, Hamilton Brass & Aluminum Castings Co.; William R. Oakley, Delhi Foundry Sand Co.; Richard A. Poirier, A & B Foundry Co.; Martin E. Rollman, Cincinnati Milling Machine Co.; Roland C. Schwartz, Kramer & Co.; E. J. Stockum, G. H. R. Foundry; Robert Thompson, H. P. Deuscher Co.; Robert E. Webb, Tri-State Foundry Co.; Raymond L. Young, Peerless Foundry Co.

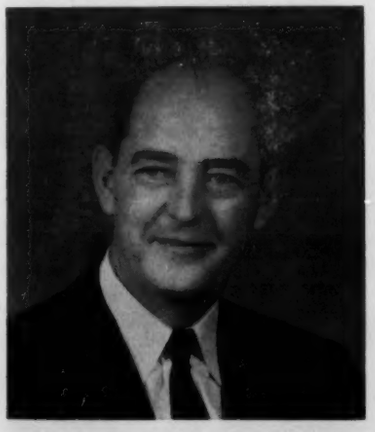
Reception committee: Peter Rentachler, Hamilton Foundry & Machine Co.; Stephen F. Dana, Peerless Foundry Co.; R. J. Redmond, Buckeye Foundry Co.; Ben Claffey, G. H. R. Foundry; Herman Ewig, Cincinnati Milling Machine Co.; Harold Ritter, Oberhelman Ritter Foundry Co.; Walter Klayer, Aluminum Industries; William Beiser, Reliance Foundry Co.; R. J. Westendorf, Dayton Casting Co.; Jesse James, Dayton Oil Co.; Arthur Alfers, Oakley Pattern & Foundry Co.; George Euskirchen, Jr., Cincinnati Foundry Co.; William Schneble, Advance Foundry Co.; Charles Erhart, Chris Erhart Foundry & Machine Co.; S. T. Korte, R. Lavin & Sons.

AFS President Shipley: "The most progressive program to be presented in many years."

W. J. Grede: Will lead-off management development plan to be initiated at Congress.



H. Bornstein: Hoyt Memorial speaker will tell Congress of progress in iron castings.



H. F. Barr: Detroit engineer says Detroit's future cars will challenge foundries.

OFFICIAL PROGRAM

61ST CASTINGS CONGRESS and 1ST ENGINEERED CASTINGS SHOW

CINCINNATI MAY 6-10, 1957

A MODERN CASTINGS BONUS

This preliminary copy of the Official Program for the AFS Castings Congress and Engineered Castings Show is published as a service to foundrymen in making their plans to attend. To remove this program, pull the center staple only.

R. W. Heine

R. W. Sandelin

R. C. Olson

■ Monday, May 6

■ *7:30 am* **Authors breakfast**
Parlor G—Netherland-Hilton Hotel

■ *8:30 am* **Registration opens**

■ *9:00 am* **Exhibits open**

■ *9:00 am* **Ladies' registration opens**

■ *9:00 am* **Malleable**
Auditorium—Music Hall

(Preprint 57–59)
Comparison of Properties of Liquid and Air Quenched Pearlitic Malleable Iron—Report of Committee 6-E
R. W. Heine, University of Wisconsin, Madison

Combustion Control in Duplex Air Furnace Practice
L. E. Emery, Marion Malleable Iron Works, Div. Chicago Railway Equipment Co., Marion, Ind.

(Preprint 57–24)
Some Observations on Galvanizing Embrittlement of Malleable Iron
R. W. Sandelin, Connors Steel Div., H. K. Porter Co., Inc., Birmingham, Ala.

■ *9:00 am* **Pattern**
Ballroom—Music Hall

Metal Corebox Equipment
W. G. Mason, Westinghouse Air Brake Co., Wilmington, Pa.

Engineering Aids For Sealing Coreboxes Against Blowbys
R. C. Olson, Dike-O-Seal, Inc., Chicago.

■ 9:00 am Steel

Hall of Mirrors—Netherland-Hilton Hotel

J. L. Dolby

Welding Steel Castings with Carbon Dioxide as a Shielding Agent
J. J. Chyle, A. O. Smith Corp., Milwaukee

(Preprint 57–71)
Effect of Carbon and Manganese on Properties of Constructional Steels for Dynamic Loading
R. D. Engquist, American Steel Foundries, East Chicago, Ind.

Hydrogen As It Affects Steel Castings
A. E. Gross, Ohio Steel Foundries, Springfield, Ohio.

■ 9:00 am Statistical Methods for the Foundry

North Hall—Netherland-Hilton Hotel

N. P. Demos

Statistics at General Electric
J. H. Davidson, General Electric Co., Schenectady, N. Y.

(Preprint 57–66)
Administrative Engineering Applications of Statistical Methods
J. L. Dolby, General Electric Co., Schenectady, N. Y.

(Preprint 57–67)
A Foundry Application of the Master Control System
N. P. Demos, General Electric Co., Schenectady, N. Y.

■ 12:00 noon Steel Round Table Luncheon

Parlors A, B, and C—Netherland-Hilton Hotel

Most Interesting to Steel Foundrymen

H. F. Barr

■ 2:30 pm Castings Engineering

Auditorium—Music Hall

An Automotive Engineer Views the Foundry
H. F. Barr, Chief Engineer, Chevrolet Motor Div., General Motors Corp., Detroit

■ 3:00 pm AFS Official Ladies' Tea

Pavillon Caprice—Netherland-Hilton Hotel

J. E. Niesse

■ 4:00 pm Safety, Health, and Legislation

North Hall—Netherland-Hilton Hotel

Health and Safety (Official Exchange Paper of the Institute of British Foundrymen)
Sir George Barnett, H. M. Chief Inspector of Factories, Ministry of Labor, England.

M. C. Flemings

Legislation Affecting Foundries
H. J. Weber, Director of Safety, Hygiene, and Air Pollution Control, American Foundrymen's Society.

■ *4:00 pm* Fundamental Papers

Hall of Mirrors—Netherland-Hilton Hotel

(Preprint 57—61)
The Fluidity of a Series of Magnesium Alloys
J. E. Niesse, M. C. Flemings and H. F. Taylor, Massachusetts Institute of Technology, Cambridge.

(Preprint 57-51)
The Fluidity of Some Aluminum Alloys
S. Floreen and D. V. Ragone, University of Michigan, Ann Arbor.

A. H. Freedman

(Preprinted in April MODERN CASTINGS)
Influence of Vibration on Solidifying Metals
A. H. Freedman and J. F. Wallace, Case Institute of Technology, Cleveland.

(Preprint 57-1)
Investigation of Metallurgical and Mechanical Effects in Hot Tearing
H. F. Bishop, C. C. Ackelind, and W. S. Pellini, Naval Research Laboratory, Washington, D.C.

■ *4:00 pm* Sand

Auditorium—Music Hall

J. F. Wallace

New Techniques for Finding "Come and Go" Causes That Affect Quality
E. C. Zuppann, Oliver Corp., South Bend, Ind.

(Preprint 57—8)
How To Determine Moisture Requirements of Molding Sands
Richard W. Heine, Univ. of Wisconsin.

■ *5:30 pm* Exhibits close

■ *8:00 pm* Malleable Shop Course

Hall of Mirrors—Netherland-Hilton Hotel

C. M. Adams

Graphitization Theory and Mechanics. Effects of Chemistry and Melting Conditions on Overall Cycles
Panel Members: F. W. Jacobs, Texas Foundries, Inc., Lufkin, Tex.; J. T. Bryce, Albion Malleable Iron Co., Albion, Mich.; L. R. Jenkins, Wagner Malleable Iron Co., Decatur, Ill.; G. B. Manweiler, Eastern Malleable Iron Co., Naugatuck, Conn.; W. J. Amsbary, Ohio Brass Co., Mansfield, Ohio; L. E. Emery, Marion Malleable Iron Works, Marion, Ind.; W. A. Zeunik, National Malleable & Steel Castings Co., Indianapolis; C. R. Sorensen, National Malleable & Steel Castings Co., Cicero, Ill.

■ Tuesday, May 7

H. F. Taylor

■ 7:30 am **Authors Breakfast**
Parlor "G"—Netherland-Hilton Hotel

■ 8:30 am **Registration opens**

■ 9:00 am **Exhibits open**

■ 9:00 am **Pattern**
Hall of Mirrors—Netherland-Hilton Hotel

Cast Epoxy Pattern Equipment
J. Templeman, Templeman Pattern and Model Co., Chicago.

Plastics in Patternmaking
Harold Burton, Canadian Steel Foundries, Ltd., Montreal, Quebec.

E. C. Zuppann

■ 9:00 am **Hearing and Radiation**
Parlors A, B, C and D—Netherland-Hilton Hotel

Loss of Hearing May Cost You Money
Dr. P. J. Whitaker, Allis-Chalmers Mfg. Co., Milwaukee.

Radiation is Hazardous
F. A. Van Atta, National Safety Council, Chicago.

J. Templeman

■ 9:00 am **Statistical Methods for the Foundry**
North Hall—Netherland-Hilton Hotel

Quality Control in a Small Foundry
Jules J. Henry, Missouri Steel Castings Co., Joplin, Mo.

Fractional Replication in Melting Experiments
J. Hromi, U. S. Steel Corp., Pittsburgh

Statistical Techniques for Attainment of Optimum Processing Conditions
A. M. Schneider, American Cynamid Co., Stamford, Conn.

F. Van Atta

■ 9:00 am **Steel**
Auditorium—Music Hall

Steel Foundry Industry Behind the Iron Curtain
J. A. Kiesler, General Electric Research Lab., Schenectady, N. Y.

A. M. Schneider

(Preprint 57–36)
Austenitic Manganese Steel Technology in Australia

Hedley Thomas, Industrial Steels, Ltd., Sydney, Australia
Presented by H. E. Cragin, Jr., Taylor-Wharton Co., High Bridge, N.J.

Grain Refinement of Stainless Steel Castings
J. L. Walker, General Electric Research Lab., Schenectady, N. Y.

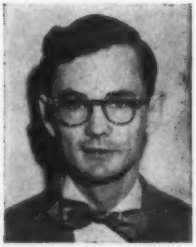
T. Logan

■ *12:00 noon* **Malleable Round Table Luncheon**
Parlors A, B, C and D—Netherland-Hilton Hotel

Castings from the Users Standpoint
Thomas Logan, Caterpillar Tractor Co., Peoria, Ill.

■ *12:00 noon* **Pattern Round Table Luncheon**
Parlors E and F—Netherland-Hilton Hotel

European Foundries and Pattern Shops
E. T. Kindt, Kindt-Collins Co., Cleveland



J. K. Sprinkle

■ *12:00 noon* **AFS Board of Directors Luncheon and Business Meeting**
Parlors E, F, and G—Netherland-Hilton Hotel

■ *12:00 noon* **Ladies Luncheon and Style Show**
Rookwood Room—Sinton Hotel

■ *2:30 pm* **Fundamental Papers**
South Hall—Netherland-Hilton Hotel

(Preprint 57–36)
Adhesion of Phenol-Formaldehyde to Various Refractory Oxides
J. K. Sprinkle and H. F. Taylor, Massachusetts Institute of Technology, Cambridge.

J. Kerverian

Effects of Gaseous and Solid Addition Elements on Surface Tension and Contact Angle (on Graphite) of Various Iron Carbon Alloys
J. Keverian, General Electric Co., Schenectady, N. Y., and H. F. Taylor, Massachusetts Institute of Technology, Cambridge.

Action of Ferrosilicon as Inoculant in Cast Iron and Effect of Magnesium
Fredrik Hurum, A/s Bjolvefossen, Oslo, Norway.

■ 2:30 pm Light Metals

Ballroom—Music Hall

(Preprinted May MODERN CASTINGS Bonus Section)
Expendable Graphite Molds in Production of Titanium Castings
A. L. Field, E. I. DuPont De Nemours & Co., Inc., Wilmington, Del., and R. E. Edelman, Frankford Arsenal, Philadelphia.

Status of Technology for Casting Titanium
G. H. Schippereit, R. M. Lang and J. G. Kura, Battelle Memorial Institute, Columbus, Ohio.

Mechanical Properties of Cast Titanium-Iron and Titanium-Aluminum-Iron Alloys
N. Hehner, H. W. Antes, and R. E. Edelman, Frankford Arsenal, Philadelphia

A. L. Field

R. E. Edelman

■ 2:30 pm Sand

Auditorium—Music Hall

Practical Studies of Veining Tendencies
George DiSylvestro, Burnside Steel Foundry Co., Chicago.

Effect of Various Clays and of Tempering Method on Sand Properties and Casting Quality
A. E. Murton, Dept. of Mines and Technical Surveys, Ottawa, Ont.

■ 2:30 pm Pattern

Hall of Mirrors—Netherland-Hilton Hotel

The Patternmaker's Application of Plastics in Industry
J. F. Roth, Cleveland Standard Pattern Works, Cleveland.

Wear Characteristics of Plastic Pattern Materials
M. K. Young, U. S. Gypsum Co., Chicago

Panel Discussion

H. W. Antes

■ 4:00 pm Malleable

North Hall—Netherland-Hilton Hotel

(Preprint 57—48)
Effects of Charge Materials and Melting Conditions on Properties of Malleable Iron
E. H. Belter and R. W. Heine, University of Wisconsin, Madison

New Foundry Testing Methods
C. A. Koerner, Central Foundry Division, General Motors Corp., Saginaw, Mich.

Investigation of Effect of Processing Variables on Properties of Pearlitic Malleable Iron
H. H. Johnson and W. K. Bock, National Malleable and Steel Castings Co., Cleveland.

G. DiSylvestro

1st Engineered Castings Show

Acme Precision Castings Co.
Dayton, Ohio

Al-Fin Div., Fairchild Engine & Airplane Corp.
Long Island, N. Y.

Alloy Steel Castings Co.
Southhampton, Pa.

Alten Foundry & Machine Works
Lancaster, Ohio

Aluminum Company of America
Pittsburgh, Pa.

American Alloys Corp.
Kansas City, Mo.

American Brake Shoe Co.
New York, N. Y.

American Light Alloys Corp.
Little Falls, N. J.

American Smelting & Refining Co.
New York, N. Y.

Apex Smelting Co.
Chicago, Ill.

Arwood Precision Castings Corp.
New York, N. Y.

Arrow Aluminum Castings Co.
Cleveland, Ohio

G. A. Avril Co.
Cincinnati, Ohio

Morris Bean & Co.
Yellow Springs, Ohio

Bendix Foundries, Bendix Aviation Corp.
Teterboro, N. J.

Brown Foundry Corp.
Camden, N. J.

Brush Beryllium Co.
Cleveland, Ohio

Buckeye Foundry Co.
Cincinnati, Ohio

The Budd Co.
Philadelphia, Pa.

Campbell-Hausfeld Co.
Harrison, Ohio

Carborundum Co., Electro Minerals Division
Niagara Falls, N. Y.

Century Foundry
St. Louis. Mo.

Chicago Foundry Company
Chicago, Illinois

City Pattern & Foundry Co.
South Bend, Ind.

Climax Molybdenum Co.
New York, N. Y.

Dayton X-ray Co.
Dayton, Ohio

H. W. Dietert Co.
Detroit, Mich.

Dike-O-Seal, Inc.
Chicago, Ill.

Dixie Bronze Co.
Birmingham, Ala.

Doehler-Jarvis Div., National Lead Co.
New York, N. Y.

Duriron Co.
Dayton, Ohio

Eastern Malleable Iron Co.
Naugatuck, Conn.

Eaton Manufacturing Co.
Vassar, Mich.

Eder Instrument Co.
Chicago, Ill.

Chris Erhart Foundry & Machine Co.
Cincinnati, Ohio

Fabricast Div., General Motors Corp.
Bedford, Ind.

Fairchild Engine & Airplane Corp.
Long Island, N. Y.

Federated Metals Div., American Smelting & Refining Co.
New York, N. Y.

General Motors Corp.
Bedford, Ind.

Gibson & Kirk Co.
Baltimore, Md.

Grede Foundries, Inc.
Milwaukee, Wis.

Samuel Greenfield Co.
Buffalo, N. Y.

Hamilton Brass & Aluminum Castings Co.
Hamilton, Ohio

Hamilton Foundry & Machine Co.
Hamilton, Ohio

Hansell Elcock Co.
Chicago, Ill.

Benj. Harris & Co.
Chicago Heights, Ill.

Howard Foundry Co.
Chicago, Ill.

Exhibitors List (complete only to March 1)

International Nickel Co.
New York, N. Y.

Janney Cylinder Co.
Philadelphia, Pa.

Kaiser Aluminum & Chemical Sales, Inc.
Chicago, Ill.

Keokuk Steel Castings Co.
Keokuk, Iowa

King Tester Corp.
Philadelphia, Pa.

H. Kramer & Co.
Chicago, Ill.

R. Lavin & Sons, Inc.
Chicago, Ill.

Lebanon Steel Foundry Co.
Lebanon, Pa.

Love Brothers
Aurora, Ill.

Lynchburg Foundry Co.
Lynchburg, Va.

Magnaflux Corp.
Chicago, Ill.

Marion Machine Foundry & Supply Co.
Marion, Ind.

Meehanite Metal Corp.
New Rochelle, N. Y.

Midwestern Foundries, Inc.
Garrett, Ind.

MODERN CASTINGS
Des Plaines, Ill.

Modern Pattern & Plastics, Inc.
Toledo, Ohio

Motor Castings Co.
Milwaukee, Wis.

Mueller Industries, Inc.
Aurora, Ill.

Nassau Smelting & Refining Co., Inc.
Staten Island, N. Y.

National Engineering Co.
Chicago, Ill.

National Lead Co.
New York, N. Y.

Non-Ferrous Foundries, Inc.
Indianapolis, Ind.

Oregon Metallurgical Corp.,
Depew, N. Y.

Peerless Foundry Co.
Cincinnati, Ohio

Peoria Malleable Iron Co.
Peoria, Ill.

"Precision Metal Molding"
Cleveland, Ohio

Pressco Co.
Chesterton, Ind.

Pyott Foundry & Machine Co.
Aurora, Ill.

Quality Aluminum Castings Co.
Waukesha, Wis.

Reliable Castings Corp.
Cincinnati, Ohio

Roessing Bronze Co.
Pittsburgh, Pa.

Rolle Manufacturing Co.
Lansdale, Pa.

I. Schumann & Co
Cleveland, Ohio

Scientific Cast Products Co.
Cleveland, Ohio

Sipi Metals Corp.
Chicago, Ill.

Sivyer Steel Casting Co.
Milwaukee, Wis.

Southern Precision Pattern Works
Birmingham, Ala.

Sterling Casting Corv.
Bluffton, Ind.

Superior Foundry Co.
Cleveland, Ohio

Swedish Crucible Steel Co.
Detroit, Mich.

Symington-Gould Corp.
Depew, N. Y.

United States Gypsum Co
Chicago, Ill

Universal Castings Co.
Chicago, Ill.

Wadsworth Foundry Co
Wadsworth, Ohio

Wagner Malleable Iron Co.
Decatur, Ill.

Waukesha Foundry Co.
Waukesha, Wis.

Wilmington Casting Co.
Wilmington, Ohio

Zenith Foundry Co
Milwaukee, Wis

W. J. Grede

- *5:30 pm* **Exhibits close**

- *7:00 pm* **Canadian Dinner**
  Roof Garden—Sheraton-Gibson Hotel

Presiding: Alex Pirre, American Standard Products, Ltd., Toronto, Ont.

- *7:00 pm* **Sand Division Dinner**
  Parlors A, B, C and D—Netherland-Hilton Hotel

Controlling Quality on the Chevrolet Cylinder Block Casting
W. C. Schartow, Chevrolet Gray Iron Foundry, General Motors Corp., Saginaw, Mich.

N. C. McClure

- *8:00 pm* **Sand Shop Course**
  Hall of Mirrors—Netherland-Hilton Hotel

Sand Control—Quality—Economy
Panel members: J. B. Caine, Foundry Consultant, Cincinnati; R. E. Daine, Aluminum Co. of America, Cleveland; M. H. Horton, Deere & Co., Moline; F. B. Rote, Albion Malleable Iron Co., Albion, Mich.; G. F. Watson, American Brake Shoe Co., Mahwah, N. J.

■ Wednesday, May 8

- *7:30 am* **Authors Breakfast**
  Parlor G—Netherland-Hilton Hotel

A. U. Khan

- *8:30 am* **Registration opens**

- *9:30 am* **AFS Annual Business Meeting**
  Auditorium—Music Hall

Presiding: AFS President F. W. Shipley

President's Annual Address
Election of officers and directors
Apprentice Contest awards
Presentation of AFS Service Citations
Presentation of AFS Award for Scientific Merit

- *11:00 am* **Charles Edgar Hoyt Annual Lecture**
  Auditorium—Music Hall

D. D. McGrady

Progress in Iron Castings
H. Bornstein, Moline, Ill.

- *12:00 noon* **Management Luncheon**
  Parlors A, B, C and D—Netherland-Hilton Hotel

Development of Foundry Management
W. J. Grede, Grede Foundries, Inc., Milwaukee.

- *2:30 pm* **Education**
  North Hall—Netherland-Hilton Hotel

The Coming Foundry Manpower Shortage
J. S. McCauley, U. S. Dept. Labor, Washington, D. C.

H. L. Womochel

■ 2:30 pm Gray Iron

Hall of Mirrors—Netherland-Hilton Hotel

(Preprint 57–2)
Inoculation of Gray Iron
N. C. McClure, Dow Chemical Co., Midland, Mich.; A. U. Khan, Whirlpool Seeger Corp., St. Joseph, Mich.; D. D. McGrady and H. L. Womochel, Michigan State University, Lansing.

(Preprinted May MODERN CASTINGS)
Tin as a Useful Alloy in Gray Iron
J. A. Davis, Battelle Memorial Institute, Columbus, Ohio.
Carbon Refractories
G. B. Tatum, National Carbon Co., Cleveland.

J. A. Davis

■ 2:30 pm Light Metals

Ballroom—Music Hall

(Preprinted May MODERN CASTINGS Bonus Section)
Aging Practice for Aluminum Alloy HP 356
A. B. DeRoss, Kaiser Aluminum & Chem. Sales., Inc., Chicago.

(Preprint 57–21)
Performance of Chills on High Strength—High Ductility Sand-Mold Castings of Varous Section Thicknesses
M. C. Flemings, Massachusetts Institute of Technology, Cambridge.

(Preprinted May MODERN CASTINGS Bonus Section)
Rigging Design for Typical High Strength, High Ductility Alloy Aluminum Casting
M. C. Flemings, Massachusetts Institute of Technology, Cambridge.

(Preprint 57–64)
Effect of Tin and Cadmium Additions to Aluminum-Rich Copper Alloys
H. V. Sulinski, R. C. Harris and Samuel Lipson, Frankford Arsenal, Philadelphia.

(Preprinted May MODERN CASTINGS Bonus Section)
Intricate Small Diameter Coring for Aluminum & Magnesium Castings
R. F. Dalton, Howard Foundry Co., Chicago.

A. B. DeRoss

■ 2:30 pm Sand

Auditorium—Music Hall

(Preprint 57–20)
Mold Hardness—What It Means
Richard W. Heine, Univ. of Wisconsin, Madison

Influence of Sand Grain Distribution on Green Sand Casting Finish
C. E. McQuiston, Advance Foundry Co., Dayton, Ohio

H. V. Sulinski

R. C. Harris

European Self-Curing Oil Binders
G. Moser, Oel-& Chemie Werk A.G., Hausen b/Brugg, Switzerland

■ *7:00 pm* **AFS Annual Dinner**
Pavilion Caprice—Netherland-Hilton Hotel

Presentation of AFS Honorary Life Memberships
Presentation of AFS Gold Medal Awards

"The Seventh Inning Stretch"
Warren Whitney, National Cast Iron Pipe Div., James B. Clow & Sons, Birmingham, Ala.

■ Thursday, May 9

■ *7:30 am* **Authors Breakfast**
Parlor G—Netherland-Hilton Hotel

S. Lipson

■ *8:30 am* **Registration opens**

■ *9:00 am* **Exhibits open**

■ *9:00 am* **Brass and Bronze**
Hall of Mirrors—Netherland-Hilton Hotel

Brass and Bronze Research Progress Report

Fracture Characteristics of Copper-Base Alloys
N. C. Howells and E. A. Lang, Naval Research Laboratory, Washington, D. C.

J. Maitre

■ *9:00 am* **Gray Iron**
Auditorium—Music Hall

(Preprint 57—9)
Gating of Gray Iron Castings
J. F. Wallace and E. B. Evans, Case Institute of Technology, Cleveland

Feed Metal Requirements for Nodular Iron Castings
Jean Maitre, U. S. Steel Corp., Johnstown, Pa.; C. Reynolds and H. F. Taylor, Massachusetts Institute of Technology, Cambridge.

Welding of Gray, Nodular & Malleable Iron
Report of Joint AWS-AFS Committee

E. A. Lang

■ *9:00 am* **Heat Transfer**
North Hall—Netherland-Hilton Hotel

Some Generalized Solidification Studies
V. Paschkis and J. W. Hlinka, Columbia University, New York.

(Preprint 57—41)
Temperature Drop in Pouring Ladles—Part 2
V. Paschkis and J. W. Hlinka, Columbia University, New York.

■ *12:00 noon* **Light Metals Round Table Luncheon**
Parlors A, B, C and D—Netherland-Hilton Hotel

Engineered Light Metal Castings
Panel members: Fred Mason, Chrysler Corp., Detroit; C. M. Curtis, Maytag Co., Newton, Iowa.

C. E. McQuiston

■ 12:00 noon AFS Past Presidents' Luncheon

Parlor I—Netherland-Hilton Hotel

Presiding: AFS Past President F. J. Dost

■ 2:30 pm Brass and Bronze

Ballroom—Music Hall

Castings Design Clinic:
Gating
F. L. Riddell, H. Kramer and Co., Chicago.

Design of Castings
G. F. Watson, American Brake Shoe Co., Mahwah, N. J., and R. A. Colton, American Smelting and Refining Co., Federated Metals Div., Newark, N. J.

E. B. Evans

■ 2:30 pm Education

North Hall—Netherland-Hilton Hotel

Meeting Your Manpower Needs
Panel members: W. H. Ruten, Brooklyn Polytechnical Institute, Brooklyn, N. Y., *Foundry Instructors Seminar;* S. C. Massari, Technical Director, American Foundrymen's Society, *AFS Training and Research Institute;* Emil J. Romans, National Malleable and Steel Castings Co., Cleveland, *Chapter Educational Activities*

R. B. Sinclair

■ 2:30 pm Industrial Engineering

South Hall—Netherland-Hilton Hotel

(Preprinted in December, 1956, MODERN CASTINGS)
Improving Foundry Layout
R. B. Sinclair, Meehanite Metal Corp., New Rochelle, N. Y.

Materials Handling
R. Peterson, Marion Machine, Foundry and Supply Co., Marion Ind.

Motion Picture—Steel Car Wheel Plant
American Brake Shoe Co.

N. C. Howells

■ 2:30 pm Sand

Auditorium—Music Hall

(Preprint 57–29)
Properties of Molding Sands Under Conditions of Gradient Heating
N. C. Howells, R. E. Morey, and H. F. Bishop, Naval Research Laboratory, Washington, D. C.

Influence of Various Bonding Materials on Stress-Strain Characteristics of Bonded Sands
F. Quigley and P. J. Ahearn, Watertown Arsenal, Watertown, Mass.

R. E. Morey

(Preprinted May MODERN CASTINGS Bonus Section)
Oil-Bonded Molding Sand
K. A. Miericke and R. C. Megaw, Baroid Div., National Lead Co., Chicago.

■ *4:00 pm* **Light Metals**
Hall of Mirrors—Netherland-Hilton Hotel

(Preprint 57—57)
Fatigue Properties of Two Die Casting Alloys
G. W. Stickley, J. L. Miller, Aluminum Co. of America, Pittsburgh.

(Preprint 57—49)
Corrosion of Aluminum Die Castings
D. L. Colwell, R. J. Kissling, Apex Smelting Co., Cleveland.

H. F. Bishop

(Preprinted May MODERN CASTINGS Bonus Section)
Vacuum Die Casting Today and Tomorrow
D. Morgenstern, Nelmor Mfg. Co., Euclid, Ohio.

(Preprint 57-74)
Automatic Metering of Magnesium for Cold Chamber Die Casting
F. L. Burkett, Dow Chemical Co., Midland, Mich.

■ *7:00 pm* **AFS Alumni Dinner**
Queen City Club

Presiding: AFS Past President B. L. Simpson

C. W. Stickley

■ *8:00 pm* **Brass and Bronze**
North Hall—Netherland-Hilton Hotel

(Preprint 57—16)
Cooperation for Technical Advancement in the British Bronze and Brass Foundry Industry
A. H. R. Franch, J. Stone & Co. and E. C. Mantle, British Non-Ferrous Metals Research Assn., London, England. Presented by R. W. Ruddell

Relation of Micro Hardness and Stresses in Copper Alloys (Official Exchange Paper)
D. J. Le Thomas, Assn. Technique de Fonderie, Paris France.

■ *8:00 pm* **Gray Iron Shop Course**
Hall of Mirrors—Netherland-Hilton Hotel

Basic Microstructures as Steps to Quality Castings
L. L. Clark, Armour Research Foundation, Chicago.

D. L. Colwell

■ Friday, May 10

■ *7:30 am* **Authors Breakfast**
Parlor G—Netherland-Hilton Hotel

■ *8:30 am* **Registration opens**

■ *9:00 am* **Exhibits open**

■ *9:00 am* **Brass and Bronze Round Table**
Parlors A, B, and C—Netherland-Hilton Hotel

CO_2 Process in the Brass Foundry

Panel members: P. H. Ducharme, Doran Manganese Bronze—Columbian Bronze Corp., Brooklyn, N. Y.; J. E. Gotheridge, Foundry Services, Inc., Columbus, Ohio; C. E. Koehler, Hamilton Brass and Aluminum Castings Co., Hamilton, Ohio.

R. J. Kissling

■ *9:00 am* **Gray Iron**
Hall of Mirrors—Netherland-Hilton Hotel

(Preprint 57—37)
Temper Embrittlement in Nodular Irons
G. N. J. Gilbert, British Cast Iron Research Assn., Birmingham, England.

Nickel Alloyed Normalized Ductile Irons
C. R. Isleib and R. E. Savage, International Nickel Co., Bayonne, N. J.

D. Morgenstern

■ *9:00 am* **Heat Transfer**
North Hall—Netherland-Hilton Hotel

Transport of Feed Metal During Solidification of Tapered Steel Bars
E. J. Sullivan, C. M. Adams and H. F. Taylor, Massachusetts Institute of Technology, Cambridge.
Flow of Heat From Sand Castings by Conduction, Radiation, and Convection
C. M. Adams and H. F. Taylor, Massachusetts Institute of Technology, Cambridge.

W. A. Pollard

■ *9:00 am* **Light Metals**
Auditorium—Music Hall

(Preprint 57—30)
Effect of Nitrogen and Vacuum Degassing on Properties of Cast Aluminum-Silicon-Magnesium Alloy
R. K. Owens, H. W. Antes and R. E. Edelman, Frankfort Arsenal, Philadelphia

(Preprint 57—43)
Hot Tearing of Magnesium Casting Alloys
R. A. Dodd, W. A. Pollard and J. W. Meier, Dept of Mines and Technical Surveys, Ottawa, Ontario.

Various Factors on Mechanical Properties of Magnesium Casting Alloys
J. W. Meier and A. Corture, Dept. of Mines and Technical Surveys, Ottawa, Ontario.

Controlled Gas Content in Foundry Work
E. Scheuer, International Alloys, Ltd., Haydon Hill, Aylesbury, Bucks, England

J. W. Meier

W. H. Johnson

G. L. Lee

D. E. Krause

J. A. Wagner

■ *12:00 noon* **Gray Iron Round Table Luncheon**
Parlors A, B, C and D—Netherland-Hilton Hotel

Economical Casting Design and Production
G. W. Schuller, Jr., Caterpillar Tractor Co., Peoria, and W. T. Schmidt, Giddings & Lewis Machine Tool Co., Fond du Lac, Wis.

■ *2:30 pm* **Brass and Bronze**
South Hall—Netherland-Hilton Hotel

(Preprint 57–55)
Effects of Geometry on Properties of Gun-Metal Castings
W. H. Johnson, Battelle Memorial Institute, Columbus.

(Preprinted May MODERN CASTINGS Bonus Section)
Production and Properties of Aluminum Alloyed Cast Cupro-Nickel
G. L. Lee, International Nickel Co., New York

■ *2:30 pm* **Gray Iron Shop Course**
North Hall—Netherland-Hilton Hotel

Inoculation as a Step to Quality Castings
D. E. Krause, Gray Iron Research Institute, Columbus.

■ *2:30 pm* **Industrial Engineering**
Parlors E and F—Netherland-Hilton Hotel

(Preprint 57–15)
An Appeal to Foundry Management
J. A. Wagner, Wagner Malleable Iron Co., Decatur, Ill.

Memomotion to Set Standards
L. L. Randolph, American Steel Foundries, Granite City, Ill.

■ *2:30 pm* **Sand**
Hall of Mirrors—Netherland-Hilton Hotel

Effect of Temperature on the pH of Foundry Sands
M. D. Brickman, General Motors Corp., Detroit, and Gordon Gottschalk, Thiem Products, Inc., Milwaukee.

Correlation Between Casting Surface and Hot Properties of Molding Sands—AFS Committee 8-J
J. A. Gitzens, Delta Oil Products Co., Milwaukee, chairman.

■ *3:30 pm* **Exhibits close**

■ *5:00 pm* **61st AFS Castings Congress and 1st Engineered Castings Show officially closes**

Gassing cement core sand with CO_2 yields early strength and increases production.

HARDENING CEMENT MOLDS WITH CO_2

Binding time slashed from hours to minutes by recent techniques developed by Dutch foundrymen

MODERN CASTINGS *presents a condensed translation of the article "Het verharden van cementzandvormen en-kerns met koolzuurgas" by H. G. Levelink, J. P. G. Bruschke, and Mej. Ir. L. A. Roos, published in Metalen, Aug. 15 and 31, 1956.—Editor.*

Molding and coremaking with cement-bonded sand has always been handicapped by the sluggish chemical reaction that brings about the binding action of the cement. Recent experiments in Holland with the use of CO_2 gas to accelerate the binding action of cement have proven so successful that foundries are using it to speed their core and mold production.

As little as five minutes exposure to CO_2 has hardened cement-bonded sand cores sufficiently to permit removal of core boxes and core handling. If the cores are not gassed, several hours must pass before the core has developed enough strength to free it from its core box. Probably the greatest single advantage arising from this treatment is the marked increase in the number of cores that can be made per hour from one core box.

Further benefits are evident when building-up vertical surfaces. Normally the absence of early strength makes it impossible to place a layer of 16 in. more than once. By resorting to CO_2 such a layer can be hardened and immediately thereafter another layer can be placed.

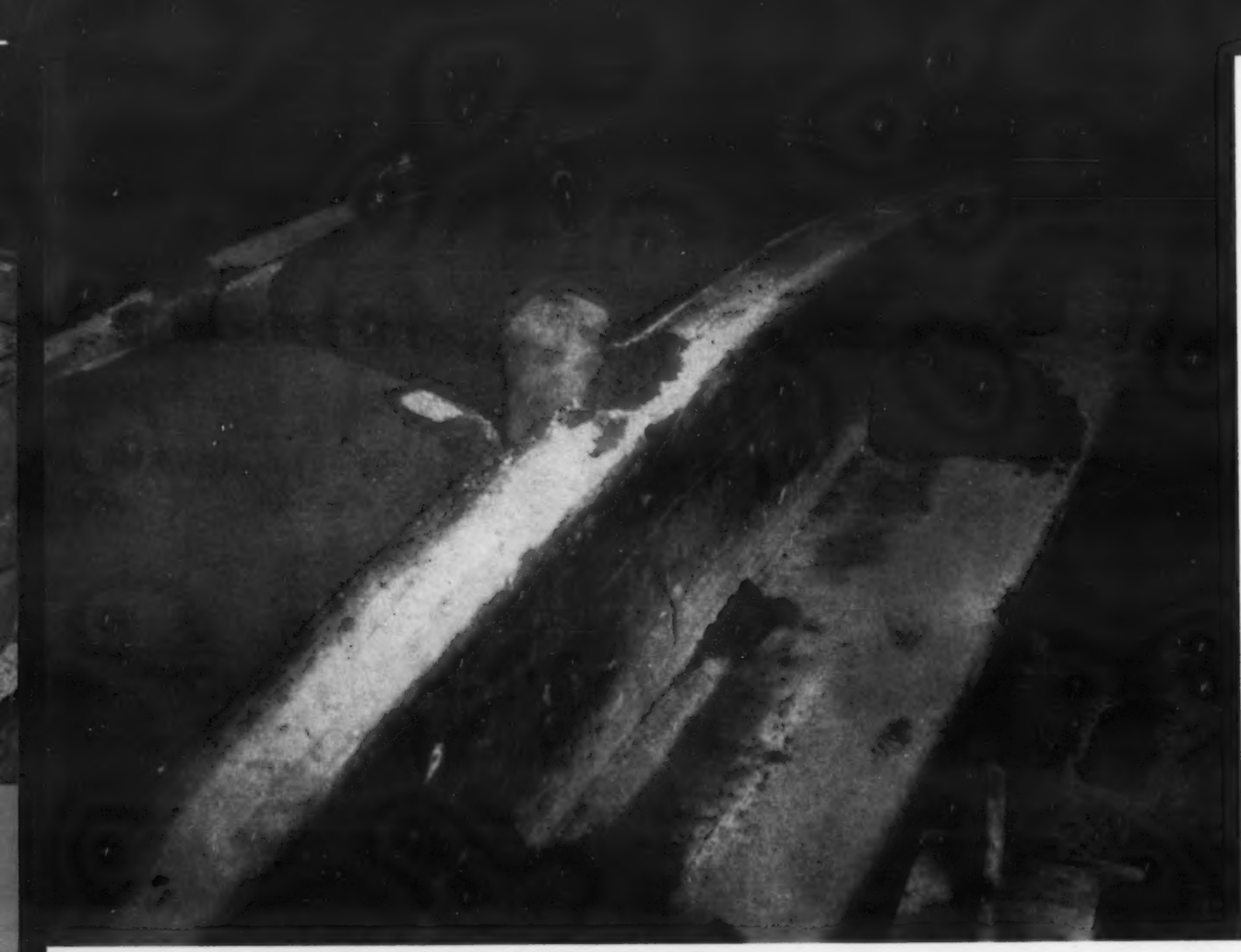
In the Dutch practice the molding sand mixture consists of 100 parts of river sand, 10 parts of high-early strength Portland type cement, and seven parts of water. The binding action comes from the slow formation of crystalline products such as calcium hydroxide and calcium hydroaluminate. In a matter of several hours a core made from this mix could be removed from its core box.

The binding process is gradually followed by the hardening process wherein the cement sand strength increases the most. This hardening develops from a gel formed by the cement, which hardens by continued reaction with water. The CO_2 treatment can only accelerate the first stage of this process, namely the binding action. The gas forms calcium carbonate which acts as a sand binder. This binding action is rapid, producing a core strength of 70 psi within six minutes.

For untreated sand binding action would not start for about three hours, and 15 hours would be required to attain this strength. In most cases gassing for three to six minutes produces enough strength for a core to hold its shape while the core box is being removed and permit subsequent careful handling.

Gassing of the sand is accomplished in a manner similar to the

Cement sand cores and molds have proven successful in producing large ferrous castings requiring heavy build-up of vertical surfaces.



Gassing for three to six min produces core strength of 70 psi; 15 hr would be required with untreated sand.

practices used in hardening sodium silicate bonded cores and molds with CO_2. Holes with a diameter of 0.24 in. are run through the length of the core with about 11.5 in. between them.

Small pipes, measuring about 0.20 in. in diameter are placed in the holes. A series of 0.04 in. holes are drilled in the pipes to allow for more uniform distribution of the gas which is blown into the core at a pressure of about 2 atmospheres. At this pressure the cement sand hardens in a radius of 6 in. around the pipes within five minutes. Approximately 2¼ lb of CO_2 will harden 440 lb of sand.

Since the formation of calcium carbonate generates heat the temperature of the sand rises. The temperature should not be permitted to rise above 120 F. Insertion of a thermometer permits following the hardening process as a function of temperature increase. Longer gassing time or more pressure may cause overheating which destroys the bonding action of the cement.

After the gassing operation the core should remain undisturbed in the box for five or ten minutes to give the admitted gas a chance to penetrate completely. The gassing pipes are then withdrawn and the core box removed.

Smaller cores can be readily handled at this stage. Larger ones must be allowed to set for a period to develop further strength. As soon as the core is out of the box it can be given any core wash that may be required. And within 36 hours it is ready to come in contact with molten metal in the casting operation.

As in the case of normal air hardening of cement sand, the final strength obtained by treating with CO_2 is dependent on the ratio of the amount of water and cement in the mixture. For sand to be gassed for five minutes it has been found that the best strength is obtained when the water/cement ratio is 0.6. As the water/cement ratio increases, the non-gassed sand needs a longer time to obtain the same strength as the gassed sand.

Comparing the sands at the end of 90 hours of air hardening, the treated sand will be stronger than the non-CO_2-treated mix. The magnitude of this difference decreases with the passage of time.

Two other ways of improving the early strength of cement sand may be used but the benefits are not so marked as in the case of CO_2. Strength can be improved as much as 10 psi by using rounded fine grain sand and also by utilizing used sand instead of new. Another approach to speeding the binding action of cement is to add to the sand an accelerator such as calcium chloride. When using such an accelerator it is difficult to control the rate of set. Unfortunately the sand mix sets so rapidly that very little time is available to ram the core or mold before the sand has hardened.

Experiences with this new technique in Holland do not indicate that it would be profitable to treat all cement sand work with CO_2. But it does permit a certain amount of speed-up in core making operations by increasing the number of cores that can be made per hour from any one core box. Also those operations requiring the use of sweeps to generate vertical mold surfaces can often be done better when it is possible to quickly harden one layer of sand with CO_2 before adding another layer of sand.

Washes may be applied as soon as core is removed from the core box.

FOUNDRY + CUSTOMER = 1st Engineered Castings Show

AFS program in Cincinnati gives casting designers and engineers opportunity to discover competitive advantages of cast metals–quality, utility, economy

Questions of casting buyers and designers concerning techniques and applications, whether technical or non-technical, will be answered at the American Foundrymen's Society 61st Castings Congress combined with the 1st Engineered Castings Show to be held in Cincinnati May 6-10. Both events have been developed around the theme of castings' quality, utility and economy.

The Castings Congress will deal with such problems as materials and techniques through a series of research papers, educational sessions and panel discussions conducted during the five days.

The Castings Show will feature actual products, demonstrating their applications and stressing the versatility of cast metal. Exhibitors will also feature castings which have replaced competitive methods of fabrication as well as quality control, the latest in metals and alloys, and patternmaking.

Emphasis for the Castings Show is being placed on bringing together casting designers and purchasers with foundrymen prior to the actual design of the casting. Designers and purchasers will have an opportunity to present their problems to casting manufacturers while foundrymen will become acquainted with difficulties facing designers and engineers.

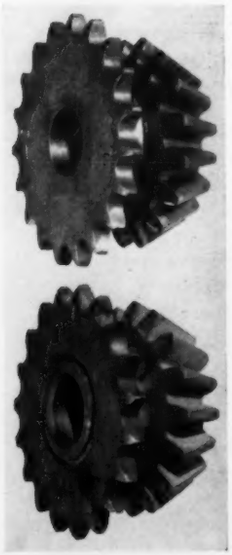
In order to concentrate on the promotion of castings, exhibitors have been limited to four classifications: producers of castings for sale; producers of patterns for sale; manufacturers of laboratory, testing and inspection equipment for control of casting quality; and producers of metals and alloys inherent in quality castings.

Typically engineered castings are two examples from Lynchburg Foundry Co., Lynchburg, Va., one of the exhibitors at the Castings Show. In one case, a bevel gear and sprocket, the bevel gear was originally made of malleable iron while the sprocket was machined from steel. The two parts were then welded together. Now the part is made in one piece using the shell mold process. Not only is the surface finish superior, but there is also a considerable saving in time.

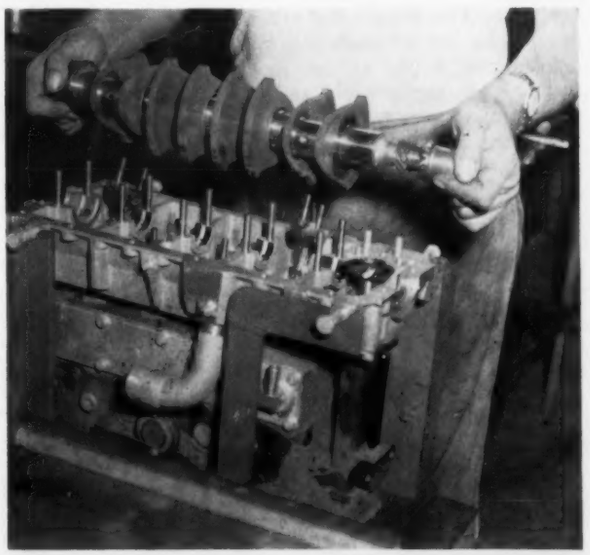
Savings in machining costs were also realized when Lynchburg replaced a forged steel crankshaft for Fageol Products Co., Kent, Ohio, with a ductile cast iron part made with shell molding. International Nickel Co., Inc., one of the producers of metals and alloys exhibiting at the Castings Show, supplied the alloys for the 80-60-03 grade of ductile iron used in the casting. This metal has good tensile and yield strengths as well as shock resistance. Extra wear resistance in the shaft journal is obtained by heat treating.

Howard Foundry Co., Chicago, will exhibit a polystyrene pattern which demonstrates the precision work possible with investment casting. The polystyrene pattern is used as temporary pattern material in casting an oil well fluid turbine rotor weighing 10 lb. It is cast of Stoody 1 metal, which has high abrasion resisting qualities. The rotor is cast to within ± 0.005 in. with 0.025 in. grind stock permitted on diameter. Its length is 11.125 in., small OD 3.6 in., and large OD 4.3 in.

Three additions have been made to the list of exhibitors at the Castings Show. They include two foundries and a manufacturer of alloys. The alloy exhibitor is the Electro Minerals Division of the Carborundum Co., Niagara Falls, N. Y. Century Foundry, St. Louis, Mo. manufactures gray iron castings as does Chicago Foundry Co., Chicago.



Design: Foundry success stories such as Lynchburg's replacement of fabricated gear with a single casting will be told at the show.



Application: Founders will show advantages of castings such as caused marine engine builder to switch from forged to cast crank.

JOHN A. MUELLER /
The Carborundum Company
Niagara Falls, N. Y.

COST CUTTING WITH GRINDING WHEELS: PART 3

INCREASING CUT-OFF WHEEL EFFICIENCY

Control of four operating conditions can sharply reduce costs and stretch service life of cut-off wheels in the foundry

This is the third in a series of four articles in which Mr. Mueller describes means for reducing the cost of foundry grinding operations. This article, and the one to follow, are devoted to cut-off operations. The first two articles covered foundry snagging operations.

Good working conditions mean more effective workers, and that is true whether we speak of employees or abrasive cut-off wheels being used in your cleaning room.

When the conditions under which the abrasive cut-off wheel is operated are properly controlled by the foundryman, the wheel life can be extended and replacement costs can be sharply reduced. The conditions of operation include wheel speed, production rate, material cut, and quality of the cut.

The standard by which the effect of any one variable condition can be measured is simply to count the number of cuts that the wheel can take under any given operating condition. The greater the number of cuts that can be taken, the more efficient the wheel is, the longer the life of the wheel, and the more money saved.

Quality of cut can be observed and related to the number of cuts. Power consumption is another related factor that can be measured. The power consumed indicates the free cutting characteristics of the wheel together with motor capacity and general ruggedness that are needed in a cut-off machine to do an efficient cutting job.

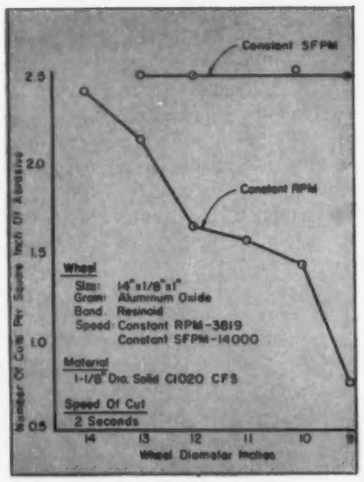


Fig. 1 . . Constant surface speed maintains efficiency.

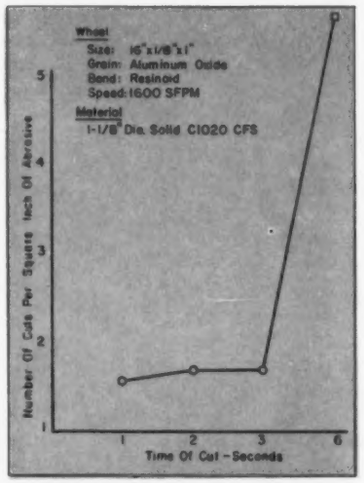


Fig. 2 . . Longer cutting time means longer wheel life.

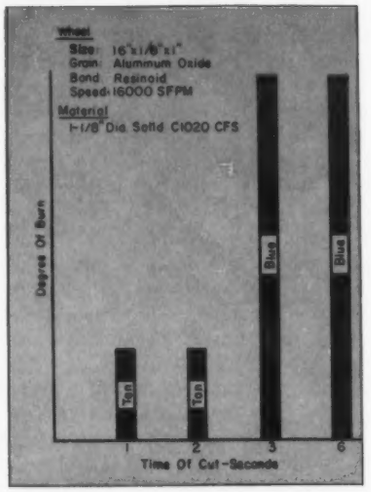


Fig. 3 . . Faster cutting prevents burning the work.

Start With Speed

The effect of wheel speed on abrasive cut-off operations is well known to industry. It is commonly agreed that as the wheel wears from full size to stub size, the wheel acts softer. This means that the efficiency is decreased and that the wheel wear becomes progressively greater. However, industry may not know how *much* faster a wheel wears as it is reduced in diameter.

Figure 1 vividly presents the loss in wheel life as it wears down from full size to stub size, when it is run at constant rpm and at a *surface* speed (sfpm). In the first two inches of wear at constant rpm, the graph shows a loss of 34 per cent in wheel efficiency. The next two inches of wheel wear produced a loss of 11 per cent in efficiency. After the wheel reached a diameter of ten inches the loss in efficiency was very great and when the wheel reached a diameter of 9 inches it had lost 70 per cent of its cutting efficiency.

Figure 1 also shows that to recover the 70 per cent loss in cutting efficiency due to decreased wheel speed, all that is required is to maintain the wheel speed at a constant sfpm. The graph clearly points out that when the wheel sfpm remains constant, the wheel operates at a constant efficiency.

Several conclusions can be drawn from Fig. 1 that will aid in reducing abrasive cut-off costs. They are as follows:

- Operate all abrasive cut-off wheels at the manufacturer's recommended speed. If wheels are operated below the recommended speeds the wheel will not perform at maximum efficiency.
- Operate abrasive cut-off wheels at constant sfpm. This probably cannot be done in all operations but what can be done, particularly when there are two or more machines in the plant, is to move wheels from one machine to another. Operate one machine at a speed consistent with the full size diameter and then after the wheel wears down two inches put it on another machine that operates at a higher speed consistent with the reduced diameter. In this way maximum efficiency will be obtained throughout the life of the wheel and abrasive costs will be cut to a minimum.

Economy check-list:

1–Operate at manufacturer's recommended speed.
2–Operate at constant surface speed.
3–Cut as rapidly as power on machine will permit.
4–Use softer wheel to cut hard material.

Time of Cut

Time per cut, pieces per minute, or production rate is a vital factor in the cut-off operation. The

time per cut profoundly affects wheel life and quality of cut, and itself is dependent upon the power available on the machine.

Figure 2 shows the wheel efficiency as it is related to the time needed to cut through the piece. As the time of cut was increased from 1 second to 2 seconds, wheel efficiency was increased 10 per cent. Another second increase in the time of cut had no effect on the wheel efficiency. However, when the time of cut was lengthened to 6 seconds, wheel efficiency increased 285 per cent.

It is apparent that the longer the wheel takes to go through the work piece the greater will be the life of the wheel. This is logical and reasonable and can be explained by physical laws. A short time of cut means that more work per unit of time is being done by the wheel. More work per unit of time means more pressure is put on each grit of the wheel and an increase in pressure results in more wheel breakdown.

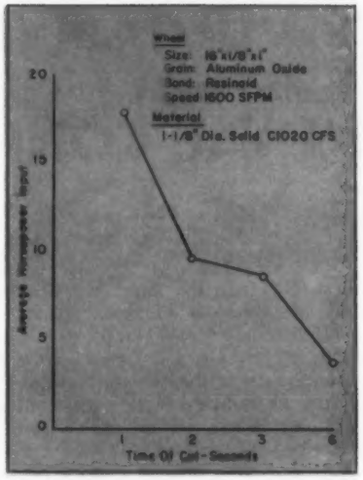


Fig. 4 . . High production calls for adequate power.

However, when the wheel is permitted to dwell in the cut for a longer time another reaction takes place. As the wheel dwells in the cut its cutting face tends to glaze and to generate more and more heat. When heat is generated the work becomes hot and eventually the work will be burned. In addition to burning the work, if the wheel dwells too long in the cut it will glaze the wheel face so much that the wheel may stall and jam in the cut and may break. Figure 3 shows the degree of burn produced by a fast cut and by a slow cut. The slower cut produced a substantially heavier burn than the fast cut.

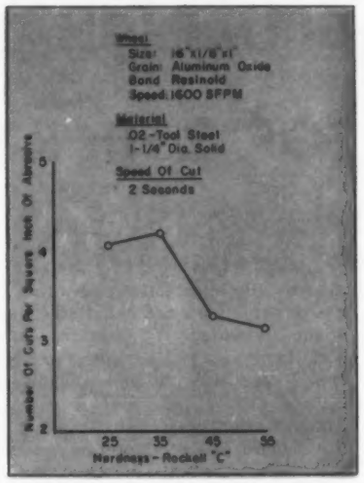


Fig. 5 . . Cutting efficiency varies with hardness of work.

The time of cut introduces another factor that is very important in the cut-off operation. The faster the cut, the more work per unit of time is accomplished. The faster that work is done the greater amount of power is required to do it. Figure 4 shows the power that is consumed when the rate of cut is changed. By lengthening the time of cut one second the power consumption dropped 46 per cent and by lengthening the time of cut to six seconds power dropped 78 per cent. If a high cut-off production rate is required, adequate power must be available, and if only a limited amount of power is available, production must be limited.

A review of the power consumed during the tests indicates that 1/3 hp was required to cut one sq in. of metal per minute. The abrasive cut-off wheel during these tests cut 60 sq in. of metal per minute. The cut-off operation is a fast stock removal process.

In summary, a fast rate of cut means high production, low labor cost, low wheel life and good quality of cut. Therefore to operate at maximum overall efficiency and to keep the total cut-off cost to a minimum, cut as rapidly as the power on the machine will permit. To operate at minimum cost it is also necessary to provide adequate power so that a proper selection of abrasive cut-off wheels may be made.

Material Hardness

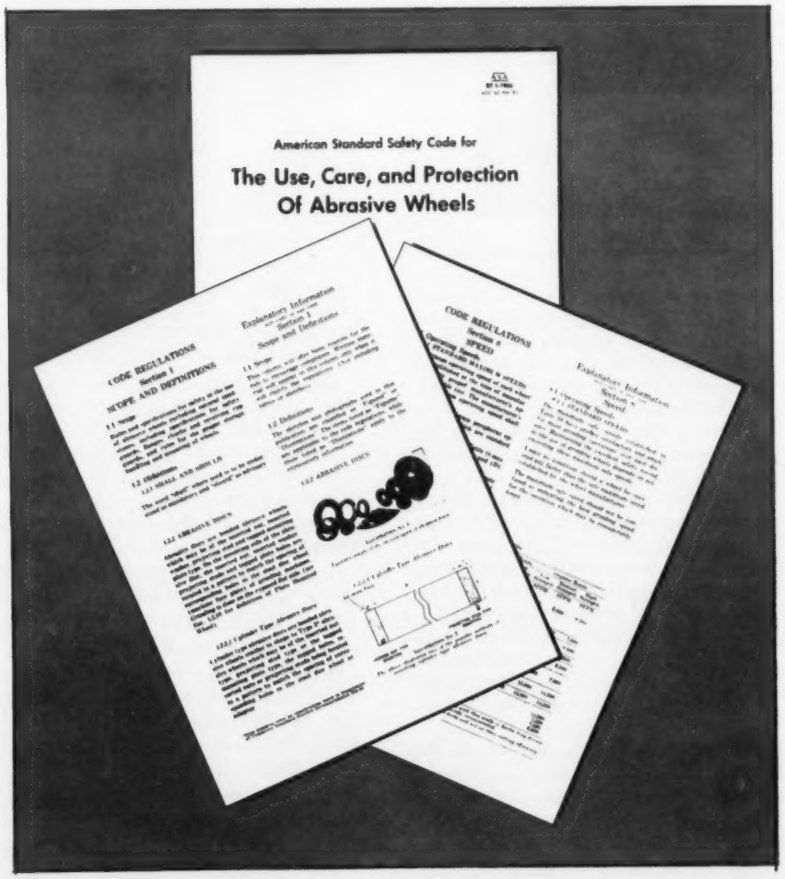
To expand the story on cut-off, a series of tests has been run to determine what effect the hardness of the material that is cut has on wheel performance. Figure 5 shows that cutting efficiency varies with the hardness of the material but not in a straight line relationship. Materials with a hardness less than Rockwell C35 broke the wheel down faster than materials with a RC35 hardness. Materials harder than RC35 likewise broke the wheel down at a more rapid rate.

From a wheel selection point of view, Figure 5 shows that soft materials are not the easiest to cut and therefore maximum efficiency cannot be expected from a wheel that is used to cut both hard and soft materials. Generally the softer the materials, the harder the grade of the cut-off wheel can be. In cutting the harder materials another factor must be considered: burn and check of the material. A wheel that is too hard will burn and check the work piece so that a general trend is to use a softer wheel when cutting hard materials.

Use Speed, But . .

Cut-off wheels should be operated at speeds only as high as are consistent with the American Standards Association safety code for abrasive wheels (ASA B7.1-1956). This code has just been revised and re-issued in a new format. The code covers the use, care, and protection of abrasive wheels, and was revised by a committee including H. J. Weber, representing the American Foundrymen's Society.

New safety code will help in planning foundry grinding operations.



BIRMINGHAM'S VULCAN ON HAND FOR 25th REGIONAL CONFERENCE

J. H. SCHAUM / *Editor*

With Vulcan, the world's largest iron man, standing atop Red Mountain, Birmingham was certainly an appropriate spot for over 500 foundrymen to gather for the 25th annual AFS Southeastern Regional Foundry Conference. This is the longest series of consecutive conferences put on by any AFS chapter.

Alabama foundrymen were outnumbered by a heavy influx from all the other southern states and even a few Yankees managed to infiltrate the ranks. In fact for the first time in the history of all Regional Conferences and quite by coincidence, introductions at the Luncheon revealed the presence of AFS President F. W. Shipley, Vice-President H. W. Dietert, Vice-President Elect L. H. Durdin, General Manager Wm. W. Maloney, Technical Director S. C. Massari, and MODERN CASTINGS Editor J. H. Schaum.

Vice-President H. W. Dietert delivered a thought-provoking address at the luncheon. From the age of the land owners in the period 1700-1800 the speaker traced the progress of humanity through various ages to the present which he defined as the age of the individual. "A foundry sells more than tonnage," according to Dietert, "it also sells the smart hours of its employees."

Sam Carter, vice-chairman of the Birmingham AFS chapter, presided at the luncheon with an air of southern graciousness that pervaded the entire two-day meeting. Silver anniversary trophies were presented to the Birmingham and Chattanooga Chapters in honor of the occasion. Acceptance was made by J. F. Drenning and H. F. Bohr, Jr. chairmen of their respective chapters.

Each technical speaker on the conference program was presented with a casting made especially for the occasion by students at the University of Alabama.

"Some Sand, Some Metal, Some Man-Made Defects" were described aptly by C. A. Sanders of American Colloid Co. at the first technical session of the Conference Thursday morning. The speaker cautioned foundrymen against hasty flight to new foundry processes as an escape from poor molding practices. Man-made defects coming from poor gating practices and careless placing of cores or closing of molds should be cured at the source.

"The foundry industry is a business of combining raw materials to form a product—a casting—at a profit." From this fundamental truth, J. A. Westover of Westover Engineers, Inc., revealed the need for *"Cost Control Methods in the Foundry."* A movie showed how six different coremakers made the same core. By studying this motion picture record the best techniques of each man were combined into an approved method that doubled the output of the slowest man.

As usual nowadays a big crowd turns out when such a subject as *"Epoxy Resins in Pattern Applications"* is discussed. The speaker on this subject was T. O. Mahaffey, Kish Resin, Inc. Because of the severe abrasive action of sand blown into core boxes, Mahaffey emphasized the importance of using an appropriate filler in the epoxy resin used to make core boxes. In his opinion the best filler from the standpoint of erosion resistance is aluminum oxide.

H. Kessler, Sorbo Mat Process Engineers, developed a formula to aid foundrymen in their *"Gating and Risering"* of castings. With communities growing more conscious of air pollution by local industries, R. C. Ortgies, American Air Filter Co., advised iron foundries on *"Air Pollution Control Equipment for Cupolas."*

On Friday morning all the foundries in the Birmingham area opened their doors to the visitors who felt much more at home plodding through sand on the molding floor than sitting

Conference Chairman Carter

in conference rooms at the Tutwiler Hotel. With balmy spring-like weather pushing the mercury up to 70 it took an excellent program to get the men back in the conference rooms for the afternoon sessions.

One of the men who had to return was F. M. Scaggs, Oklahoma Steel Castings Co., since he was speaking on *"Carbon Dioxide Cores in Production."* His plant is making over eight tons of CO_2 cores per day—60 per cent of their production. The sand is being reclaimed in their wet sand reclamation unit and reused in green sand molding. Cores made by this process have resulted in lower handling and breakage costs, reduced oven equipment, and elimination of driers.

Bronzed by Florida sun, H. M. St. John, consultant, dwelled on *"Highlights of Modern Brass and Bronze Foundry Practice."* The speaker felt that under average conditions a foundry could afford to invest $15,000 to $20,000 in mechanization for each man whose labor can be saved.

Probably no subject is attracting more attention among iron foundries than *"Operating A Basic Water Cooled Cupola"*. For this reason A. P. Alexander of International Harvester Co. was called on to relate his experiences. They start with one inch of refractory lining in the cupola and operate four or five days, banking the cupola overnight. When running with a basic slag the cupola requires more metallurgical supervision.

Coming to Birmingham from Chicago via Los Angeles, F. L. Riddell, H. Kramer Co., spoke on the *"Control of Quality for Copper-Base Alloy Castings."* Taking the major points-design, raw materials, foundry practice, equipment, and the human element—the speaker explained how each point affected the foundry practices for copper-base alloys.

The highly successful technical program was brought to a close by W. B. Bishop, Archer-Daniels-Midland Co., talking *"Common Sense in the Core Room."* The speaker described the basic characteristics and the types of production best suited for the various coremaking processes. Bishop's closing remarks were "An alert foundryman will use that process which gives him the cheapest core that produces a cavity effectively."

On the social or distaff side of the Regional, the ladies auxiliary invited the men-folks to a nearby country club for an affair that outshone even the most highly mechanized foundry in Birmingham.

Traditionally the Regional was brought to a close with the annual banquet. E. E. "Pop" Pollard came all the way from Tyler Pipe & Foundry Co., Tyler, Texas, to serve in the capacity of toastmaster. Pop was capably backed up by one of the famous Notre Dame Four Horsemen and All American Quarterback, Harry A. Stuhldreher, Asst. to vice-president, United States Steel Corp., who as guest speaker pointed out the importance of full every day living with much to be done in his community after he leaves the office or plant.

BADGER FOUNDRYMEN CHECK ON PROBLEMS OF CASTINGS INDUSTRY IN A CHANGING WORLD

20th Wisconsin Regional AFS Conference drew record attendance for talks covering castings and world confusion

Reporting of the Wisconsin Regional Foundry Conference was done by the co-chairmen of the technical sessions under direction of D. N. Gerlinger, Walter Gerlinger, Inc. Conference photos are by Bob De Broux, Milwaukee Chaplet and Supply Co.

The multiple problems of the foundryman as he faces modern life were detailed in both the technical and non-technical talks presented at the 20th Annual Wisconsin Regional Foundry Conference. Held February 14 and 15 at the Hotel Schroeder, Milwaukee, the conference was sponsored by the Wisconsin Chapter of the American Foundrymen's Society and the University of Wisconsin and was attended by a record crowd of 769 foundrymen.

Conference chairman was Norman N. Amrhein, Federal Malleable Co., who had as co-chairmen L. J. Woehlke, Grede Foundries, Inc., and Prof. E. R. Shorey, University of Wisconsin. Planning for the conference's 20 technical sessions was handled by L. J. Andres, Lawran Foundry Co., the conference program chairman.

Chapter President George J. Barker, University of Wisconsin, opened the conference program and introduced Kurt F. Wendt, Dean of the university's College of Engineering. Wendt's talk, *"Engineering Education and Industry,"* outlined the problem of providing engineering manpower for industry and the problems involved in increasing the basic science content in the engineering curriculum. Dean Wendt concluded his talk with a description of university research projects now under way which have a direct bearing on the metal castings industry.

Congratulations to the chapter on its 20th conference were offered by AFS President Frank W. Shipley. President Shipley discussed the purposes of AFS.

AFS General Manager Wm. W. Maloney followed President Shipley at the speaker's rostrum. Maloney recommended to foundrymen that they stay "reasonably dissatisfied with what you have, because this is the basis of progress."

Keynote technical speaker was Harry E. Gravlin. In his talk, *"Times Do Change,"* Gravlin cautioned foundrymen to become aware of the changing emphasis in industrial management. He stated that the current pattern in management thinking is to attempt to provide for the employee "what you think you would want to have." Foundries must compete for the labor force with firms now being guided by this philosophy, and because of this competition foundrymen may find that the introduction of industrial hygiene programs "will be a strong factor in your ability to make money."

Principal speaker at the luncheon following the opening session was Charles J. Kersten, Milwaukee attorney and former member of Congress. Kersten spoke on *"The Political Defeat of Communism,"* and showed a motion picture.

The afternoon was devoted to two sets of simultaneous technical sessions on steel, gray iron, malleable, nonferrous, and pattern subjects. In the first round of sessions Jack B. Caine, foundry consultant, Wyoming, Ohio, spoke on *"Can We Make Perfect Castings?"* at the steel session. Gray iron foundrymen heard Walter Edens, Allis-Chalmers Mfg. Co., discuss *"Nodular Iron."* The malleable session featured a paper on *"Pouring Effect On Scrap,"* which was presented by Joe Orlof, Central Foundry Division, General Motors Corp.

A. E. Rich, Wheelabrator Corp., told non-ferrous foundrymen about *"Cleaning Room Problems and Methods Used in the Cleaning Room,"* while John E. Stock, John Deere Co., discussed *"Cast to Size Cast Iron Patterns"* at the pattern session.

Steel foundry people heard about one of foundry consultant Caine's hunches: that although the molder is now king bee of the shop, the pouroff man probably deserves more of this attention. Gating and metal flow govern perfect castings, and this, Caine stated, is more important than sand problems. Turbulence in the metal is a big factor in producing a good casting, and pouring should be controlled by keeping the sprue full and the ladle low.

Further information on the Allis Chalmers development of nodular iron, described in MODERN CASTINGS, November, 1956, was presented by Mr. Edens at the gray iron session. Edens also discussed basic cupola operation from the practical aspect.

Joe Orlof's presentation at the malleable meeting was a discussion of gating to control pouring rate and its effect on castings. He stated that skimmer cores were practically eliminated in his plant by means of gate restrictions.

Dr. Ralph E. Lapp showed foundrymen uses of nuclear power in tomorrow's world.

Too many interested patternmakers showed up for John Stock's talk on cast iron patterns, and 50 had to be turned away from the hall. Stock's talk on the production of cast iron pattern equipment was based on information he presented in an article in *American Foundryman* (MODERN CASTINGS), April, 1955.

The afternoon's second round of technical sessions included L. O. Eikrem, Baird-Atomic, who spoke on *"Spectrographic Analysis,"* at the steel meeting. Arthur Lindgren, Magna-Flux Corp., told the gray iron group about *"Magnetic Particle Inspection as it applies to Gray Iron Castings."* Robert Schauss, Werner G. Smith, Inc., presented a paper on *"Gating and Risering,"* at the malleable meeting.

"Trends in Modern Copper Base Foundry Alloys," were discussed at the non-ferrous session by Dr. George A. Halliwell, H. Kramer and Co. and *"Pattern Research,"* was the topic of David Kindt, Kindt-Collins Co., at the pattern session.

Eikrem described spectrographic analysis as being better than chemical analysis, giving an accurate and complete analysis in 3 to 5 minutes with 1 per cent tolerance in each of the major percentages. The limitation of the analysis, he stated, is only in that it does not analyze sulfur, phosphorous, or carbon in the lower ranges.

Corrective inspection of casting doesn't cost,—it makes money, according to Mr. Lindgren. He stated that corrective control leads to easier pouring castings, lighter castings, and stronger castings. Above all, he remarked, such a program provides the customer with reliable performance and satisfaction.

Schauss's paper approached the subject of gating and feeding of castings from the standpoint of yield of metal charged to good castings. He pointed out that cost savings of $7500 per year are possible by increasing a yield of 25 ton per day net good castings operation by only 4 per cent.

At the pattern session, Mr. Kindt showed a film illustrating the problems and expense encountered in the development of a new product. He then discussed the problems in using the new pattern materials and the use of synthetic coatings on wood and metal patterns.

Principal speaker of the conference banquet which followed the final technical sessions was Dr. Ralph E. Lapp, director of the Nuclear Science Service. Lapp, associated with the development of nuclear power from its very early days, discussed *"The World of Tomorrow."*

Dignitaries at the conference banquet included: AFS President F. W. Shipley; K. F. Wendt, University of Wisconsin dean of engineering; Prof. George J. Barker, Wisconsin Chapter president.

According to the speaker only $1 million was spent in the field of atomic energy during 1941. In 1957 this figure should reach $2½ billion.

Simultaneous sessions were conducted Friday morning and afternoon for each of the five groups. In the morning, Harry Weaver, Brillion Iron Works, Inc., discussed *"Shell Cores"* at the malleable meeting. The non-ferrous group heard Urban F. Von Rosen, district cost consultant, Non-Ferrous Founders' Society, and William A. Gluntz, Gluntz Brass & Aluminum Foundry, explain *"Budgeting for Profit."* *"Water-Cooled Cupolas"* were the subject at the gray iron meeting presented by R. J. Aylward and J. Goudzwaard of Neenah Foundry Co.

"Mass Plastic Pattern Pouring" was presented at the pattern meeting by William Weaver, Modern Pattern and Plastic Co. The steel session centered around *"Air Placement of Refractories"* delivered by Jack O'Reilly, Harbison-Walker Refractories Co.

H. J. Weaver said that shell molding can compete with other types of molding but that a casting to be produced economically must be designed for the process. He pointed out that shell core making is lagging behind shell molding, that only within the past year has production equipment been available for producing shell cores. Weaver said that practically all shell core making machinery is designed to produce hollow cores. Three benefits are derived from hollow cores, a reduction of the sand needed, better gasing and venting, and superior collapsibility.

Recommendations for budgeting were made at the non-ferrous session, those attending were presented with examples of job cost records, charts and other forms needed to obtain a clear record of operations. Emphasis was placed on the need, preparation and use of a budget by Von Rosen and Gluntz.

The use of independent water jackets or water glands in the melting zone of water-cooled cupolas as used at Neenah Foundry Co. was summarized at the gray iron meeting by Aylward and Goudzwaard. Waterjackets were adopted because of low-cost, minimum of installation time and low operating cost—the daily water cost per cupola is $8 and the water is used to flush slag from the front slagging spout and in the emission collectors on top of the stack.

O'Reilly traced the development of the air placement of refractories at the steel meeting. He stated that many problems have been overcome and that air patches are now used in many installations. He recommended that the gun nozzle be kept about 2 ft from the surface being patched and that the principles in patching included keeping the material throttled with the surface being built gradually by rolling the nozzle and keeping the gun moving. He said that more gunning will be done in the future, particularly with basic practice.

William Weaver at the pattern meeting said the plastic industry is seeking a material that can be poured like plaster in a mass form. The speaker described and listed the equipment and materials needed to make plastic patterns. He recommended high temperatures for best service.

At the concluding sessions, Richard Heine, University of Wisconsin, discussed *"Hot Cracks"* at the malleable meeting. Non-ferrous participants heard R. L. McIlvaine, National Engineering Co. discuss *"Sand Preparation and Handling for Small Foundries."* K. MacKay Smith, quality control consultant, explained *"Quality Control"* at the steel session while the steel group heard A. F. Holden, A. F. Holden Co., explain *"Sodium Hydride and Other Salt Bath Descaling of Steel Castings."* The pattern members listened to *"Pattern Equipment Necessary for Shell Molding"* as explained by John Nieman, Shell Process, Inc.

Happy event during meeting was celebration of C. H. Zahn's birthday. Charlie, left, is 81 and a candidate for the chapter's board of directors. Active as superintendent of Vilter Mfg. Co.'s foundry, he was dining with W. A. Pfeiffer.

Contraction in white iron was outlined by Heine at the malleable meeting. He said that hot cracks and tears are the result of contraction with five other variables which include shrinkage tears, cracks and tears related to the stability of the mold, core tears, design and stress tears, and miscellaneous causes such as improper gating, poor bottom boards and bumping of molds at the time metal is setting.

A chalk talk technique was used by McIlvaine to discuss the problem of sand handling in small foundries.

The purpose of quality control is to control and improve the various foundry processes, affecting the average job performance in each type of work produced, Smith explained to the gray iron group. He emphasized that quality control systems reduce foundry scrap, salvage and customer return and it is attractive to job shop managements because it requires but one person on a part time basis to handle the paper work.

The increasing use of salt bath descaling and desanding of castings was presented by Holden to the steel session. Slides were used to show typical foundry installations. In discussing the sodium hydride reaction, Holden said that the principal function of this product is to combine with metal oxides to form additional caustic soda. He explained that the sodium hydride process differs entirely from the proprietary salt compounds since this reaction is a complex reaction between anhydrous ammonia, which is cracked to hydrogen, or pure hydrogen in a generator unit and therefore the hydrogen and metallic sodium react to sodium hydride.

Slides were used at the pattern session by Nieman to show the progress of shell molding since 1953. Nieman pointed out that layout is highly important since the location of ejector pins is a problem. Sprue design was explained and the various core shell machines were covered by the speaker.

MALLEABLE FOUNDERS' HOLD T & O CONFERENCE

Foundrymen from 46 malleable plants meet to exchange technical data and experience

J. H. SCHAUM / *Editor*

Over 140 members and guests gathered at the Wade Park Manor Hotel in Cleveland, Feb. 7 and 8, to confide their technical and operating problems with each other.

According to J. H. Lansing, M.F.S. technical and research director, the program was designed "for the free and informal interchange of information and experience on day-to-day production problems." Foundrymen representing over 46 different malleable plants were treated to a program that dealt with malleable melting, coremaking, use of stress analysis, inspection and dimensional tolerance, production of pearlitic, research, nodular iron, and scrap reduction.

Five speakers described various aspects of melting malleable iron. The first speaker, Russell Sawyer, Frazer & Jones Div. of Eastern Malleable Iron Co., described their procedure for *"Direct Air Furnace Melting."* In charging the furnace it is advantageous to place the pig iron on top of the steel and return scrap because it melts easiest dissolving the steel as it runs over it.

In contrast with coal fired practice, Milton Tilley, National Malleable and Steel Castings Co., described *"Air Furnace Oil Firing in Duplex Melting."* An oil flame will burn out twice as much carbon from the melt as coal. As a consequence about 0.30 per cent carbon is removed from the melt in 45 minutes in the holding furnace.

Carl F. Joseph, Central Foundry Div., GMC, extolled the benefits to be derived from *"Hot Blast Use."* In his experience with a 400 F cupola blast he found increases in melting rate, temperature of iron at the spout, and thermal efficiency. Marked decreases appeared in coke consumption, oxidation of alloying elements, bridging difficulties, sulfur pick-up, misruns and hot-tears.

"Dehumidification" of cupola blast was recommended by Fred Jacob of Texas Foundries, Inc. The installation of equipment cost $24,000 and operates for $6.02 per day. On a production of 100 tons of iron per day they figure a saving of $51.57 of coke per day.

The *Melting Session* was concluded by R. H. Greenlee, Auto Specialties Mfg. Co., speaking about *"Water Cooled Cupola Operations."* The speaker pointed out the advantages of external cooling. External cooling involves lower installation and operational costs. The cooling water can be used to sluice off the slag from the slag tap-hole.

After the Luncheon the group reassembled for an afternoon devoted to core materials and production. Hans Jacob, Lehigh Inc., spoke about the CO_2 process. By heating CO_2 gas to 300 F he found it possible to cure cores faster with less gas. Lehigh has been casting 90 mm drill cartridges in manganese bronze using vertical molds made by the CO_2 process. The complete details of this process are described in an article entitled "We Owe Our Success to CO_2" appearing in this April issue of MODERN CASTINGS.

C. O. Williamson, Grinnell Corp., related his experiences with cores made by the CO_2 process as compared with oil bonded cores. In most instances they found that cores for pipe fittings, supports, hangers, unions, etc. could be made cheaper in oil bonded sand.

Albion Malleable Iron Co. practices for making *"Shell Cores"* were described by F. B. Rote. Because of the tendency for the sand and resin to segregate when blowing with a dry mix, they have turned to warm coating of sand with resin.

Earl Woodliff reviewed the 190 page *"Core Research Report"* prepared three years ago for the M.F.S. and encouraged members to make more use of the information.

Malleable Founders' Society President Leon J. Wise, shown on left, and J. H. Lansing, M.F.S. technical and research director, take a break during the two-day conference held in February at Cleveland.

After a congenial reception and sumptuous banquet the members were treated to a fine talk on *"Sport Car Racing"* by W. F. Milliken, Jr. followed by an exciting color movie of the 1956 Le Mans Sports Car Race in France.

The Friday morning session started off with discussions of the use of "Stress Analysis" as an aid to designing castings. Joe Beckham of Texas Foundries described how they use stresscoat (brittle lacquer) and SR-4 strain gages to measure strain on the surface of castings subjected to loads that simulate service conditions. W. R. Gilmore, Superior Steel and Malleable Castings Co., continued the discussion on this subject. The complete story of casting design techniques used at Superior were shown in an excellent color-sound movie.

The next session was devoted to *Casting Inspection and Dimensional Tolerance.* Carl Koerner, Central Foundry Div., GMC, described the sonic testing equipment designed and built by General Motors for the Danville Foundry. Cobalt 60 radiography has been used extensively in developing the proper gating and risering system for new castings. In working out a system for one malleable casting over 257 radiographs were taken. W. T. Cole, Canton Malleable Iron Co., described how they produced cast bolts to an accuracy of 1/10,000 of an inch. R. Rosien of Eastern Malleable Iron Co. described their inspection procedures. By cleaning malleable castings in the hard condition they can be inspected and scrap rejected early in the manufacturing process thus saving heat treating and handling expenses.

Production of pearlitic malleable is aided by the use of isothermal salt baths according to Paul A. Green, Erie Foundries (General Electric Co.). Carl O. Schopp compared his practices at the Indianapolis Plant of Link-Belt Co. with those of General Electric. Their quenching is done in oil and excellent results are achieved.

The Basic Properties Research Project was summarized by L. C. Marshal, Chairman of the Project Steering Committee. Stress rupture tests conducted at Purdue University indicate that high carbon malleable can be used safely at 12,000 psi at 800 F for 10 years.

"Nodular Iron—Economics, Control and Properties in Production" was the subject dealt with by H. W. Ruf, Grede Foundries, T. E. Eagan, Cooper-Bessemer Corp., and Eric Welander, John Deere Malleable Works. The first speaker emphasized the importance of having a basic slag to reduce the sulfur to the low content required to make nodular iron. The second speaker emphasized the importance of fatigue properties of nodular iron to meet the needs of compressors built by Cooper-Bessemer Corp.

The scrap reduction programs in their respective plants were outlined by Henry Felten of Peoria Malleable Castings Co. and Robert Cech of the Chicago Works, National Malleable & Steel Castings Co.

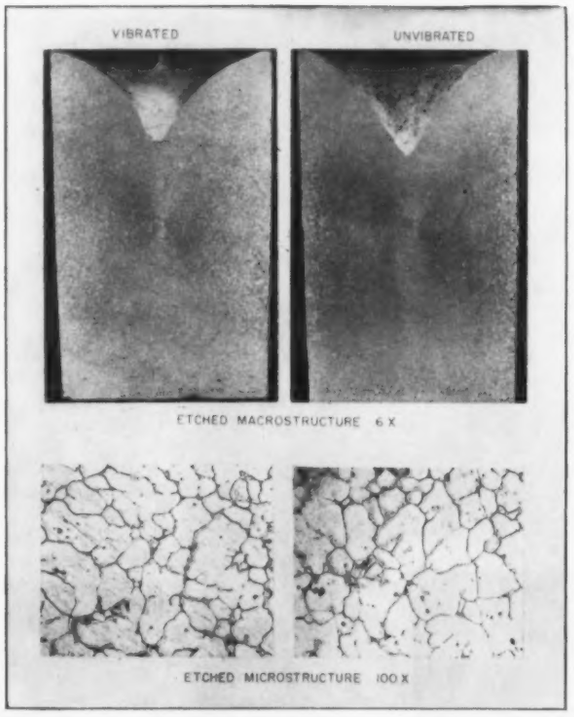


Fig. 1 . . Vibrating at 60 cycles effects structure of aluminum 4.5 per cent copper alloy in cold mold.

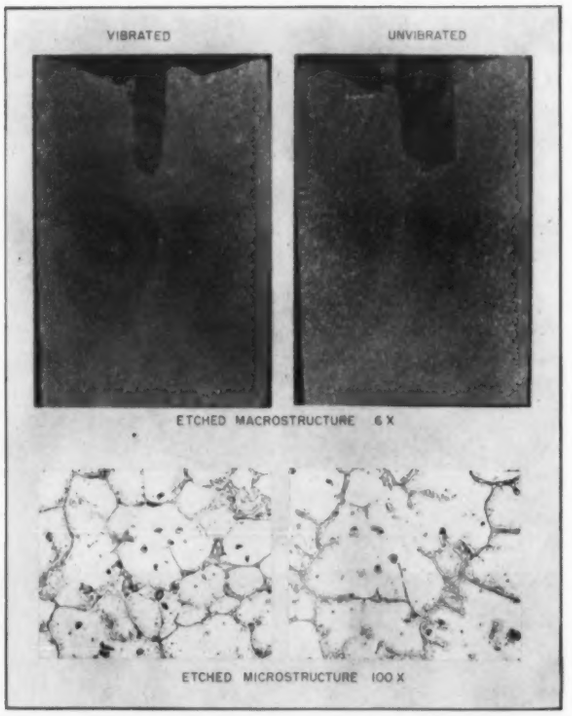


Fig. 2 . . Frequency of 20 kc has greater effect on structure of aluminum alloy in preheated mold.

A. H. FREEDMAN /
Research Assistant
Case Institute of Technology

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Prof. Metallurgical Engineering
Case Institute of Technology

Ultrasonics refines grain-size and develops tougher non-ferrous alloys

VIBRATING STRENGTH INTO METALS

Stronger, harder metal results when various aluminum and copper base metals are vibrated during solidification in a mold. Yellow brass and non-grain refined aluminum—4.5 per cent copper alloy benefit particularly, and gain improved tensile properties and refined grain size through vibration.

Use of the correct vibrator to send waves of energy through the molten metal permits application of the techniques to metal in sand, permanent, or investment molds.

Although vibration of solidifying metal is not now employed in the commercial production of castings, the application to solidifying brass, at least, offers distinct possibilities.

Other workers have previously reported that vibrational energy applied to solidifying metals can reduce the segregation and grain coarsening during solidification, and thereby improve the mechanical properties under certain conditions. Schmid and Roll (1) found that vibration, applied during solidification, promoted grain refinement in bismuth alloys. Jones (2) determined that ultrasonic vibrations produced grain refinement in solidifying magnesium and zinc.

Richards and Rostoker (3) studied the effect of sonic vibrations on the solidification of aluminum alloys and reported that the amount of grain refinement was dependent upon energy intensity up to about 4 G's acceleration and virtually independent of frequency in the range of 60 to 1500 cycles per second. It was also noted that the grain refining effect of the vibratory energy occurred during actual solidification and that the application of vibration to the melt above the liquidus did not influence the final structure.

Hinchliff and Jones (4) applied sonic vibrations to the solidification of a ferrous alloy cast into investment molds. The treatment produced a smaller, more equi-axed structure with great improvement in the mechanical properties.

New Investigation

The grain refining effect of vibratory energy has been well established but little information is available on the correlation of this effect with the mechanical properties resulting from the treatment.

A slight improvement in ductility and no change in strength has been reported for aluminum-copper alloys (3). A series of experiments was conducted in this investigation to determine the effects of sonic and ultrasonic vibrational

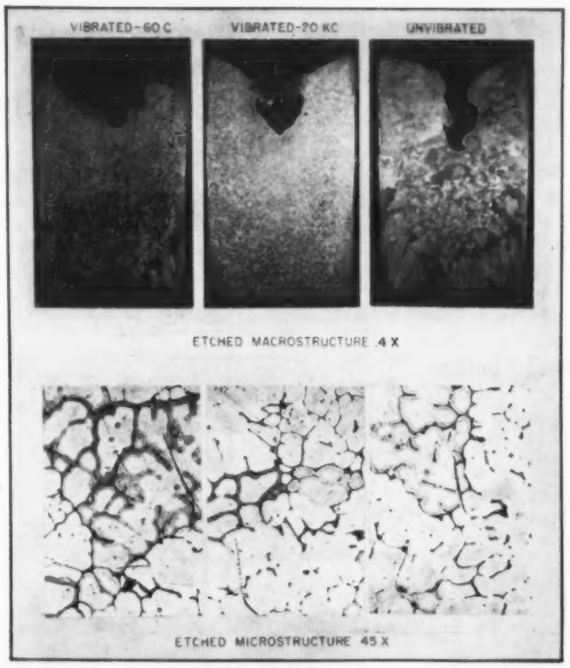


Fig. 3 . . When no grain refiner is used benefits of vibrating aluminum alloys is more pronounced.

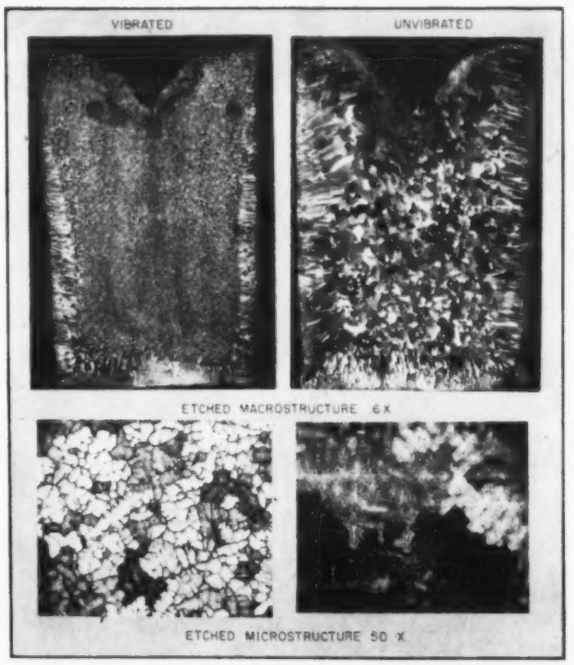


Fig. 4 . . Vibration of yellow brass at 60 cycles results in reducing grain diameter 95 per cent.

energy, applied during solidification, on the structure and mechanical properties of several conventional copper and aluminum foundry alloys. An attempt has also been made to investigate the mechanism by which such phenomena are produced.

The alloys employed in the vibration studies were aluminum–4.5 per cent copper with and without grain refiners, aluminum–12 per cent silicon, yellow brass, and high strength yellow brass (manganese bronze). The analysis of each is listed in Table I.

All of these alloys were vibrated at 60 cycles per second; the aluminum-copper alloys and yellow brass were also subjected to ultrasonic vibrations of 20,000 cycles per second. Each vibrated ingot was accompanied by an unvibrated control ingot cast under similar conditions. The types of ingots cast, pouring and mold temperatures, chilling of the ingot, and frequency of vibration are listed in Table II.

The aluminum alloys were melted in a gas-fired crucible furnace using a separate, removable, clay-graphite crucible for each alloy. The high strength and regular yellow brass were melted in a high frequency induction furnace with a clay-graphite crucible. Approximately ten pound heats of the aluminum alloys and 30 pound heats of the two copper alloys were individually melted for each ingot. The aluminum alloys were degassed with chlorine and the efficiency of the treatment judged by the reduced pressure test (5). The brasses were degassed by flaring.

The ingot mold consisted of a slightly tapered steel tube, 8 in. in length and 4.5 in. inside diameter with a 0.25 in. wall thickness welded to a steel base plate that contained a hollow cooling chamber. Water or compressed air could be circulated through this chamber to provide a chill effect. The walls of the mold were sprayed with an insulating material. Before casting, the mold was preheated by a gas burner to remove moisture and attain the preheat temperature listed in Table II.

The 60 cycle, low frequency vibrations were applied by rigidly bolting the mold to the top surface of a 60 cycle per second electromagnetic vibrator. The mold was purged with nitrogen and the vibrator started prior to casting the ingot. A layer of vermiculite was placed on the top surface of the molten metal immediately after pouring and the vibration continued at the desired intensity level until the ingot solidified.

A 20 kilocycle (kc), 110 watt magneto-striction generator was employed for treating the solidifying alloys with ultrasonic vibrations. This higher frequency equipment required the submersion of a metal coupler below the surface of the melt to transmit the vibrations. It was necessary that this coupler be wet by the molten metal in order to transmit appreciable vibrational energy into the melt.

The molten metal was poured into the mold, the preheated coupler immersed into the melt, and a layer of vermiculite placed on the metal. Vibration was continued until the ingot solidified. A titanium bar was employed as the coupler for treating the aluminum (6); an inconel bar was utilized for vibrating the yellow brass.

Each ingot was sectioned vertically for metallographic, tensile, and density measurements. One-half of each ingot was finish machined for macro-etching. Three 0.212 in. diameter tensile specimens and one density coupon were machined from the other half of the ingot. One test bar was removed from the center line and one from midway between the center line and each outside surface, approximately 2 inches from

TABLE I CHEMICAL COMPOSITION OF ALLOYS

	Al-4.5% Cu alloy containing grain refiners	Al-4.5% Cu alloy free of grain refiners	Al-12% Si alloy	Yellow Brass	Manganese Bronze
Cu	4.18	4.12	.56	63.53	60.59
Al	balance		balance		5.46
Si	.93		12.03		
Fe	.53		.71	.46	3.00
Mn	.01		.11		4.07
Zn	.04		.33	balance	balance
Mg	trace		.08		
Ni	trace		trace	.26	trace
Ti	.09	.01			
Sn				.93	nil
Pb				2.12	nil
Sb				.05	

TABLE II CASTING CONDITIONS FOR INGOTS

Alloy	Mold Temperature	Pouring Temperature	Mold Chilling Medium	Vibration Conditions
Al-4.5% Cu with grain refiners	Room Temp.	1325°F	water	no vibrations
	Room Temp.	1325	water	60 cycle
Al-4.5% Cu with grain refiners	1100°F	1340	compressed air	no vibrations
	1100	1330	compressed air	20 kc
Al-4.5% Cu without grain refiners	1100	1350	none	no vibrations
	1100	1350	none	60 cycle
	1100	1350	none	20 kc
Al-12% Si	Room Temp.	1330	none	no vibrations
	Room Temp.	1330	none	60 cycle
Yellow Brass	Room Temp.	1930	water	no vibrations
	Room Temp.	1930	water	60 cycle
Yellow Brass	1700	1850	none	no vibrations
	1700	1850	none	20 kc
High Strength Yellow Brass	1100	1940	none	no vibrations
	1100	1940	none	60 cycle

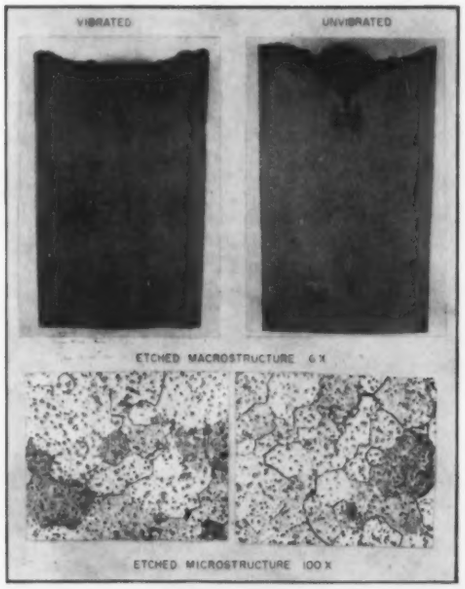


Fig. 5 . . Manganese bronze shows no structural change from 60 cycle vibrations.

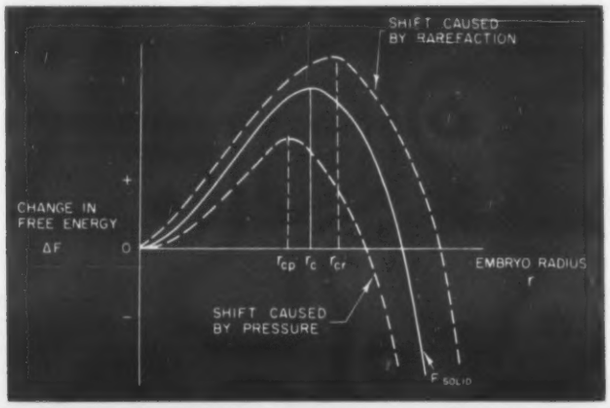


Fig. 6 . . Stable or critical nucleus size is lowered or raised by pressure changes.

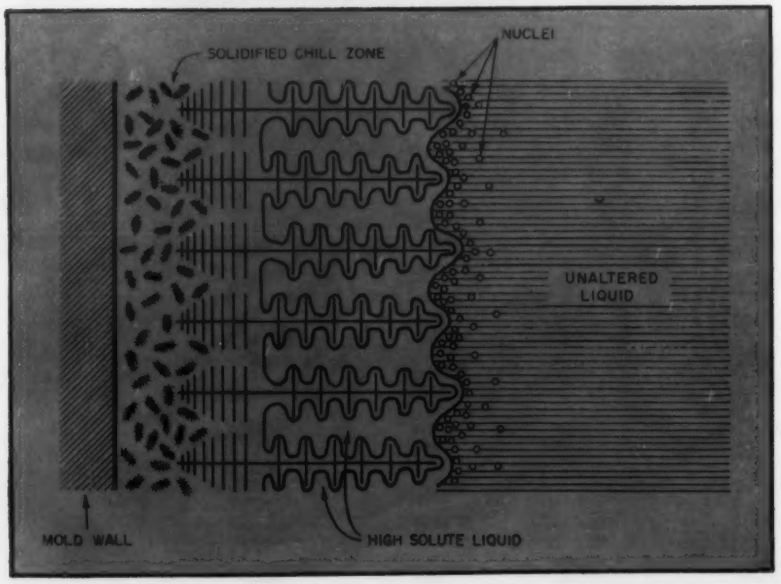
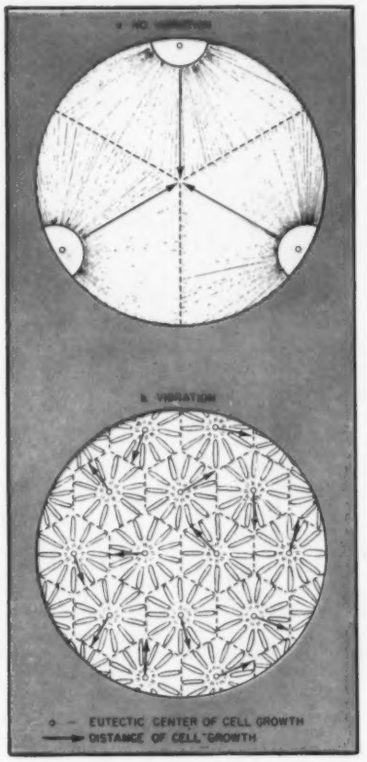


Fig. 7 . . Diagram shows mechanism of grain growth in solidifying casting.

Fig. 8 . . Vibration prevents coarse eutectic structure found with undercutting.



the bottom of the ingot.

The aluminum bars were solution treated at 960 F and aged at 310 F for 3 hours before testing. The copper base alloys were tested in the "as cast" condition. The density coupon was cut from the center line of the ingot approximately one inch from the bottom. Density was determined by weighing the coupon in air and water. The face of the density coupon was employed for grain size measurement.

Test Results

The test results demonstrate the influence of vibration on grain size and mechanical properties. The average results obtained from these tests are shown in Table III. Although 60 cycle vibration produced little alteration in the grain size or mechanical properties of the aluminum-4.5 per cent copper alloy treated with grain refiners, 20 kilocycle vibrations appear to have refined the grain of this alloy considerably and improved the strength, hardness, and ductility to some extent.

The macro and microstructure of the vibrated and unvibrated control ingots for 60 cycle and 20 kc vibrations are shown in Fig. 1 and 2 respectively. The generally better strength and ductility of the ingot vibrated at 60 cycles and

TABLE III AVERAGE PROPERTIES OF VIBRATED AND UNVIBRATED CAST INGOTS

Alloy	Vibration Conditions	Avg. Grain Diameter	Tensile Strength	Yield* Strength	Elongation	Reduction in Area	Hardness
Al-4.5% Cu with grain refiners	no vibration, 60 c	.92mm	35,100 psi	29,700 psi	5.9%	8.2%	57 BHN
	3.9 G's acceleration .021" amplitude	.83	36,000	29,300	6.3	8.8	61
Al-4.5% Cu with grain refiners	no vibration	.22	23,800	—	2.2	4.3	61
	20 kc, 110 watts	.14	26,800	—	3.1	5.4	63
Al-4.5% Cu without grain refiners	no vibration	2.4	19,400	—	2.9	5.4	36
	60c, 3.5 G's, .018"	1.2	21,500	—	3.1	6.8	41
	20 kc, 110 watts	1.0	26,400	24,600	4.4	9.0	43
Yellow Brass	no vibration	2.2	31,100	12,900	43	43	46
	60 c, 3.5 G's, .019"	.11	38,800	15,900	43	40	52
Yellow Brass	no vibration	6.1	28,200	11,400	45	44	44
	20 kc, 110 watts	1.9	30,100	12,300	39	42	45
High Strength Yellow Brass	no vibration	.13	122,500	96,900	18.0	23.5	235
	60 c, 3.5 G's, .019"	.14	123,300	98,300	19.4	24.0	239

*.2% offset

this unvibrated control ingot compared to the 20 kc cycle vibrated control ingot can be attributed to the faster rate of solidification of the former.

The ultrasonically vibrated ingot and its control ingot were cast in a pre-heated, air-chilled mold but the ingots in the 60 cycle investigation were poured into a cold, water-chilled mold. The slower rate of solidification of the ingot vibrated at 20 kc was desirable to allow time for manipulating the magnetostriction transducer.

Walther, Adams, and Taylor (7) have shown that the mechanical properties of aluminum alloys are markedly influenced by the rate of solidification. The ingots cast in the air-chilled mold solidified in approximately 13 minutes compared to a 3 minute solidification time for the ingots cast in a water-chilled mold.

The increase in grain refinement and improvement of mechanical properties obtained with ultrasonic treatment of aluminum-4.5 per cent copper appeared to be the result of the higher energy intensity applied by the magnetostrictor and not the higher frequency or longer period of vibration.

Richards and Rostoker (8) have shown that the grain refining effect in aluminum-4.5 per cent copper was primarily dependent upon energy intensity and almost independent of frequency. Computations indicate that considerably more energy was introduced into the melt by the ultrasonic transducer than the 60 cycle vibrator. However, even at this higher energy level the grain refinement was moderate and the improvement in mechanical properties is relatively small.

The results obtained on the grain refined aluminum-4.5 per cent copper alloy may well have been masked by the effect of grain refiners. The investigation was therefore conducted on an aluminum-4.5 per cent copper alloy containing no appreciable amounts of grain refiners. The effect of vibration proved to be considerably greater in the non-refined alloy. The influence of this vibration is clearly shown by the macro and microstructures of the various ingots contained in Fig. 3 and the me-

chanical properties shown in Table III.

The metallographic and mechanical test results clearly indicate that both the 60 cycle and 20 kc vibrations produced an effective grain refinement and accompanying improvement in properties over the unvibrated control ingot.

The 20 kc vibrations again produced increased refinement and better strength and ductility than the lower, 60 cycle vibration. The 20 kc vibrations decreased the grain size by 58 per cent and increased the tensile strength by 36 per cent and the reduction in area by 40 per cent; the 60 cycle vibration treatment refined the grain 50 per cent but only improved the tensile strength approximately 9 per cent and the reduction in area by 26 per cent. These results represent average figures based on the mechanical properties determined from 3 tests on each of three sets of ingots.

The above tests indicate that the effects of vibrations on the mechanical properties of an aluminum-4.5 per cent copper alloy are substantial only when the alloy does not contain grain refiners. The improvement in strength and ductility produced by vibration of the unrefined aluminum-4.5 per cent copper alloy is not of great commercial significance since aluminum alloys may be easily grain refined by additions of titanium (carbide) and boron.

The application of 60 cycle vibration to solidifying yellow brass was observed to exert a considerable influence on the grain size and tensile properties. The metallographic structures and mechanical test results of the unvibrated control ingot and 60 cycle vibrated ingot of this material are shown in Fig. 4 and Table III respectively.

The macrostructures clearly indicate that the vibration treatment produced a reduction in average grain diameter of 95 per cent and greatly reduced the length of the columnar dendrites. The columnar dendrites which do appear on the outside surface of this ingot were probably the result of the very rapid chilling in this zone. The 60 cycle vibrational energy increased the tensile and yield strengths of yellow brass by approximately 24

per cent with no significant change in ductility. This improvement appears to be directly the result of the grain refinement.

Commercial Prospects

The application of vibrations to solidifying brass offers distinct commercial possibilities since this metal is not readily susceptible to the action of grain refiners. The mechanical and cold forming properties of yellow brass, and in fact the entire group of copper-zinc alloys which solidify as a single solid solution, are highly sensitive to grain size. Brass cast by conventional methods usually solidifies with a coarse-grained columnar dendrite structure with considerably lower strength than similar fine grained material.

Low frequency vibrations can be applied by simple and inexpensive equipment, however the large vibration amplitudes of low frequency vibrators limit their use to permanent or possibly strong investment molds since sand molds would probably shatter. Ultrasonic vibrations appear to offer possibilities for treatment of brass solidifying in a sand mold because of the lower vibration amplitudes.

In order to determine the influence of higher frequency vibrations on this metal, a yellow brass ingot was solidified under 20 kc vibrations and compared to an unvibrated control ingot.

The macrostructure of the vibrated ingot demonstrates a distinct decrease in grain size and length of columnar dendrites. However, the most grain refinement was produced in the center of the ingot, closest to the vibrating coupler, indicating that either insufficient energy was transmitted to the melt or the brass absorbed this energy to a considerable extent.

Higher power equipment was not available at this time to investigate this phase further, but, it is evident from the limited mechanical test results contained in Table III that the strength could be improved by this grain refinement.

Two sets of high strength yellow brass (manganese bronze) ingots were cast to determine the effect of 60 cycle vibrations on the mechanical properties of this alloy. The metallographic structure of

these ingots is shown in Fig. 5. Examination of these structures show no observable changes in the macro or microstructures as a result of the vibration, although both vibrated and unvibrated ingots exhibited a relatively fine grained structure without columnar dendrites.

Apparently, this more complex metal solidified by a different mechanism than the single solid solution aluminum-copper and copper-zinc alloys previously investigated and therefore was not effectively refined by vibration. As would be anticipated from the metallographic structure, the application of vibrations failed to exert any significant influence on the mechanical properties shown in Table III.

The density determinations did not show any significant effect of applied vibrations of either 60 cycles or 20 kilocycles.

Grain Refinement

The mechanism by which vibrational energy can produce this grain refinement and improvement in mechanical properties provides an interesting subject for analysis and hypothesis. It has been proposed (8) that the grain refining effects of vibration were produced by fragmentation of primary crystallites, thereby providing an artificial source of stable nuclei.

Other investigations (3), however, noted that certain primary solids, notably silicon plates and $FeAl_3$ needles in aluminum, and graphite flakes in cast iron were actually coarsened by the action of vibration. The coarsening effects observed are difficult to reconcile with the fragmentation theory, especially since the crystallization products coarsened were significantly more brittle than those refined.

It has been recently hypothesized (3) that the number of stable nuclei is increased by the peculiar dependence of the rate of embryo formation on the embryo size.

On the basis of this work, however, a new hypothesis is offered that appears to be both direct and in agreement with all observed phenomena. Since the specific volume of the solid is lower than the

liquid in these solidifying systems, the Le Chatelier principle would predict that the pressure wave of vibration would tend to promote the solid state or effectively decrease the diameter of the critical stable nucleus size during solidification.

Since the pressure and rarefraction waves are equal and opposite, the number of stable nuclei would be increased if the stable nuclei grew rapidly enough during the pressure wave to be stable during the following rarefraction wave. The diameter of a stable nucleus would also be decreased, without the necessity for rapid growth of the nuclei, if a standing wave pattern were established in the melt.

The influence of vibrational waves on the plot of embryo radius versus change in free energy is shown graphically in Fig. 6. It is evident from an analysis of this plot that the stable or critical nucleus size is decreased by increasing pressure and increased by decreasing pressure. Either rapid growth of the stable nuclei formed in the pressure wave in a random wave system or the establishment of a standing wave system can therefore account for the effect of vibration on nucleation.

The application of vibrations can, therefore, result in an increase of the number of stable nuclei existing immediately ahead of the advancing wave of dendrites in a solidifying solid solution system and produce a considerable grain refinement of such a system. This effect is shown schematically in Fig. 7.

The stable nuclei are formed in the uniform liquid metal solution immediately adjacent to the high solute liquid areas surrounding the dendrites. This mechanism of growth occurs throughout the liquid as soon as the temperature drops appreciably below the liquidus and produces a fine-grained, equi-axed structure instead of the large, columnar dendrites.

This hypothesis demonstrates that applied vibrations assist the liquid-solid metal solidifying system in approaching the equilibrium state and has been suggested by other investigators. The results of both 60 cycle and 20 kc vibrations

applied to the aluminum and copper base alloys in this investigation clearly show the effect of vibrations on metals solidifying as single phase solid solutions.

The effect of vibration on the solidification of a eutectic alloy is considerably different than a solid solution alloy because of the difference in mode of solidification, however, the hypothesis offered also can explain this effect.

A eutectic liquid experiences some difficulty in forming stable nuclei of the proper mixture of the eutectic constituents from which the solidification of the cells or grains of eutectic can proceed. Liquid metal of a eutectic composition has been observed to undercool considerably below the eutectic temperature because of the delay involved in forming stable nuclei of the proper composition.

After appreciable undercooling, stable eutectic cells will be nucleated, and because of the high energy accompanying the liquid to solid phase change produced by the undercooling, growth of these cells and of the solid constituents contained in these cells will be very rapid. A eutectic solidification consists of the nucleation and growth of both the eutectic cells and the individual eutectic constituents in these cells.

Undercooling results from a paucity of stable cell nuclei but when these stable nuclei finally appear, the growth of the cell and nucleation and growth of the eutectic constituents within the cell is very rapid, as shown schematically in Fig. 8a. This undercooling and subsequent rapid growth of the solid eutectic cells produces a structure that has fine eutectic constituents (because of their rapid growth) and relatively few eutectic cells.

However, the application of vibrational energy during solidification increases the number of stable cell nuclei, reduces undercooling, and produces a much finer eutectic cell structure. Under these conditions, the nucleation rate of the actual eutectic constituents is much slower. They exist at a temperature close to the equilibrium eutectic temperature but the growth of those nuclei of the eutectic constituents that are formed is rapid since the time-tempera-

ture conditions favor diffusion and growth.

The higher temperature at which the eutectic grows during vibration is the result of the absence of appreciable undercooling and the rapid heating of the metal surrounding the more closely packed eutectic cells. The volume of metal surrounding each eutectic cell is increased in temperature by the heat of fusion associated with the stable nucleation and growth of these cells. This produces the coarser structure of eutectic constituents but finer cellular structure shown in Fig. 8b.

A series of aluminum-12 per cent silicon ingots were cast to illustrate the coarsening effects of 60 cycle vibrations on the structure of a eutectic alloy as predicted by this hypothesis. The vibrated ingot exhibited a finer cell structure but coarser eutectic constituents than the unvibrated control ingot. Cooling curves were also taken which showed that the 60 cycle vibration treatment decreased the amount of undercooling by approximately 6 C.

The failure of high strength yellow brass to be influenced by applied vibration is believed to be due to the mode of solidification of this material. The large observable shrinkage that occurs with this alloy indicates that it solidifies with a solid-mold wall but Fig. 6 does not show the usual large columnar dendrites associated with single phase, solid solution solidification.

It is suggested that two or more solid solutions solidify simultaneously in this metal and that the rate of nucleation is sufficiently rapid, once the liquidus temperature is attained that it is not appreciably affected by vibration.

Summary

The effect of vibration on the structure and tensile properties, when applied to solidifying melts of various aluminum and copper base alloys was determined. Vibrations of 60 cycle frequency from a magnetic vibrator and 20 kilocycles frequency from a magnetostrictive sources of vibration.

Vibrations refined the grain size

markedly and improved the strength of alloys that solidified as single phase solid solutions such as aluminum—4.5 per cent copper without grain refiners and yellow brass. The higher frequency, 20 kilocycle, vibrations were more effective than the lower, 60 cycle frequency. The addition of grain refiners to the aluminum—4.5 per cent copper alloy greatly reduced the influence of applied vibrations.

An alloy which solidified as a eutectic, such as aluminum—12 per cent silicon, was differently affected by vibrations since the eutectic cells were refined but the individual eutectic constituents coarsened. High strength yellow brass, did not solidify either as columnar dendrites or a eutectic and was not influenced by applied vibration during solidification.

A hypothesis has been advanced to explain the mechanism of the effect of vibration on solidifying metal. This theory explains the phenomena observed in this investigation by describing the influence of vibration as that of decreasing the size of stable nuclei during solidification.

Acknowledgment

The assistance of P. A. G. Carbonaro, Director of Rodman Laboratory, Watertown Arsenal, who sponsored this investigation and provided valuable advice during the work is gratefully acknowledged. The aid of Messrs. J. F. Novak and Edward Ulrich, of Case Institute of Technology, in performing many phases of the investigation is acknowledged.

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Overseas Foundrymen and Scientists Will Visit AFS Castings Congress

■ The American Foundrymen's Society will be host to an unusual number of foreign visitors and authors of technical papers during the 61st Castings Congress and Engineered Castings Show. Eight papers in the program for the Congress are authored by scientists from European nations, and overseas industrialists who have announced plans to attend the Cincinnati meetings include personalities from the Orient as well as Europe.

The eight technical papers authored by overseas foundrymen are:

The official exchange paper of the Institute of British Foundrymen, *"Health and Safety,"* by Sir George Barnett, H. M. Chief Inspector of Factories, Ministry of Labor, London, England. This paper will be presented at a session devoted to the problems of safety, health, and legislation.

"Austenitic Manganese Steel Technology in Australia," by Hedley Thomas, Industrial Steels, Ltd., Australia, will be presented by H. E. Cragin, Jr., Taylor-Wharton Co., High Bridge, N. J., in Thomas' absence.

A fundamental papers session will hear *"Action of Ferrosilicon as Inoculant in Cast Iron and Effect of Magnesium on Formation of Nuclei,"* by Fredrik Hurum, A/s Bjolvefossen, Oslo, Norway.

"European Self-Curing Oil Binders," will be discussed in a paper by G. Moser, Oel-& Chemie Werk A. G., Hausen b/Brugg, Switzerland. E. C. Zirzow, Werner G. Smith, Inc., Cleveland, will present the paper in the author's absence.

Two foreign-authored papers will be presented to brass and bronze sessions. The official French exchange paper, *"Relation of Microhardness and Stresses in Copper Alloys,"* will be presented by P. J. LeThomas, Assn. Technique de Fonderie, Paris, France.

"Cooperation for Technical Advancement in the British Bronze and Brass Foundry Industry," by A. H. R. French, J. Stone & Co.; and E. C. Mantle, British Non-Ferrous Metals Research Assn., will be presented by R. W. Ruddell.

A gray iron session will hear *"Temper Embrittlement in Nodular Irons,"* by G. N. J. Gilbert, British Cast Iron Research Assn., Birmingham, England.

"Controlled Gas Content in Foundry Work," will be presented to a light metals session by E. Scheuer, International Alloys, Ltd., Haydon Hill, Aylesbury, Bucks., England.

Foreign visitors to the Congress will also include a group of 20 members of the Society of German Foundrymen. These foundrymen will attend the Congress as a part of a six-weeks tour of the U. S. castings industry.

Another overseas visitor is expected to be Katsu Maiya, Tokyo Chuzo Co., Tokyo, Japan. His foundry has been selected by the Japanese government as the model middle-sized factory in Japan and Maiya plans to visit the U. S. before completing the mechanization of his plant.

G. Barnett

G. Gilbert

A. French

F. Hurum

P. LeThomas

E. Mantle

F. Moser

E. Scheuer

Steel Founders' Publishes Safety Manual for Management

A seven-point safety program for foundry management personnel has been published by the safety committee of the Steel Founders' Society of America. The book entitled *"Accident Prevention Manual for Steel Foundry Executives"* outlines the part that management must play in the safety program. The sections of the book include: *The Real Need for an Effective Safety Program; Safety and Health Program; Training of Employees; Safety Engineering; Plant Fire Prevention and Protection; Medical Facilities and Care;* and *Accident Records.*

Statistics in the book show the effectiveness of the Society's safety program which was started in 1941. Since then the accident rate of member foundries has consistently declined and in 1954 the society was cited by the National Safety Council for its safety promotion program.

foundry trade news

Esco Limited has completed new office, warehouse, and plant in Vancouver, B.C. Foundry being built at Port Coquitlam, B.C., will supply rough castings to be finished in these new Esco facilities.

General Motors Corp. . . will build an aluminum foundry near Massena, N. Y. The plant will be operated by the Chevrolet division and will be ready for operation in June, 1959. GM and Reynolds Metals Co. have entered into an agreement under which Reynolds will provide aluminum from a reduction plant to be built in the same area.

Fletcher Foundry Division . . Fletcher Works, Inc., Philadelphia, has started a $100,000 modernization program at its gray iron foundry.

Al-Fin . . division of Farichild Engine and Airplane Corp., Deer Park, N. Y., has announced that four Japanese firms have acquired licenses to use the Al-Fin casting process. The firms are: Furukawa Electric Co., Ltd.; Izumi Automotive Industries Co., Ltd.; Sumitomo Metal Industries, Ltd.; Toyo Kogyo Co., Ltd.

NIBCO, Inc. . . is new name of Northern Indiana Brass Co., Elkhart, Ind. Company states that it now operates the "first automatic non-ferrous foundry in the world."

Detroit Gray Iron Foundry Co. . . has purchased Valley Steel Casting Co., Bay City, Mich. Detroit Gray Iron also operates Lansing Foundry Co., Lansing, Mich., and Oakland Foundry and Machine Co., Rochester, Mich.

Sun Tube Corp. . . reports processing a record 6 million lb of aluminum at its foundry during 1956. The 30-man shop makes slugs used to produce collapsible tubes by impact extrusion.

Vitro Corp. of America . . has joined with Sheer-Korman Associates, Inc., and the Great Divide Mining and Milling Corp. to form a new company U. S. Manganese Corp., which will produce manganese from domestic ores. Principal sources will be high-grade, domestic manganese silicate deposits from which manganese can be recovered through use of a newly developed process.

Lectromelt Furnace . . division of McGraw-Edison Co., Pittsburgh, has announced that it will exchange engineering and manufacturing information with Demag-Electrometallurgie G.m.b.H. of Duisburg, Germany. The two firms are the largest arc furnace builders in the world.

Permanent Mold Die Co., Inc. . . Detroit firm has announced an expansion of its facilities.

Shell Equipment, Inc. . . new shell mold equipment producer with offices at Bridgeport and Connellsville, Pa., has been organized by Wm. J. White and associates. Company will sell and service machinery manufactured by Ronce Mfg. Co. An agreement has been made with Cooper-Chapman Co., Toronto, under which Shell Equipment will produce and sell Cooper-Chapman equipment in the U. S. Foundry research, and consulting service will be offered through a subsidiary.

Shell Process, Inc. . . manufacturer of shell molding machines and allied equipment, recently moved into new and larger quarters at West Springfield, Mass. The firm maintains its own wood and metal pattern making facilities, as well as a machine shop.

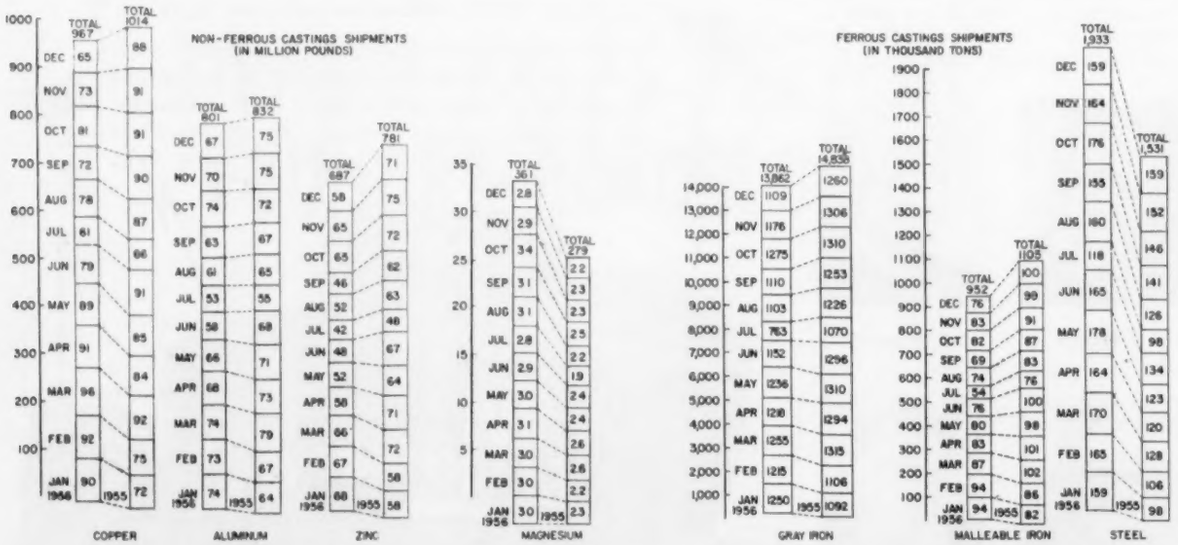
Die casters used about 360,000 tons of slab zinc in 1956 according to the American Zinc Institute. Biggest consumer is the automotive industry; 1957 cars have an average of 65 lb of zinc parts, 1956 models only 60 lb.

Link-Belt Co. . . increased net income 46 per cent in 1956 on a 27 per cent sales gain.

Shaw Process Development Corp. . . Port Washington, N. Y., organization reports that Hitchiner Mfg. Co., Milford, N. H., and Arwood Co., New York, have obtained licenses to its "Investment X Process."

Shipments of magnesium castings in 1956 showed an increase of 30 percent over 1955 shipments, the Mag-

how's business?



Prepared from data collected by the U. S. Bureau of Census. Above bar charts compare castings shipments by months. For each metal classification, the left-hand bar shows shipments in the twelve most recent months for which data are available. Dotted lines run to the right-hand bar showing comparable figures for each month of the previous year. Total shipments for twelve months appear at the top of each bar. Four different scales are used because of the different magnitudes of shipments.

nesium Association reports. Year end total for shipments was 18,084 short tons.

Industrial furnace builders had their best peacetime year in 1956 according to the Industrial Heating Equipment Association.

Kaiser Aluminum & Chemical Corp. . . disclosed that unaudited net profits for 1956 calendar year exceeded $42 million.

National Lead Co. . . in 1956 had the highest level of sales and earnings in its 65 year history. Earnings exceeded $63 million.

Norton Co. . . has broken ground for a new $1,500,000 refractories plant at Worcester, Mass. Plant is scheduled for completion in January, 1958.

Electro Refractories and Abrasives Corp. . . has record sales of over $6 million in 1956.

Jensen, Inc. . . is the new name of Jensen Specialties, Inc., industrial oven and conveyor manufacturer.

Link-Belt Co. . . will move its Louisville district office to 235 East Burnett St. Newark, N. J., office has moved to 293 Morris Ave., Summit, N. J.

Day Sales Co. . . has been organized in Minneapolis as a subsidiary of the Day Co. to engineer and install dust control and bulk materials handling systems.

Magnaflux Corp. . . has enlarged its main plant in Chicago with a 10,000 sq ft building addition.

Morris P. Kirk & Son, Inc. . . Los Angeles headquartered firm has been appointed a distributor of aluminum pig and ingot products by Reynolds Metals Co.

This promotion to engineer means twice the work, lots of prestige . . . and maybe someday more pay.

the SHAPe of things

safety, hygiene, air pollution

by HERBERT J. WEBER

CAUTION! WATCH OUT FOR TRUCKS!

I know a foundryman who accidentally drove a power truck through the charging door of a cupola and was thrown into the cupola. Fortunately the charge was high, making it possible for him to escape and live to tell about it. It won't happen in that plant anymore—a curb stop has now been installed.

Power trucks are not toys and are nothing to play with. I ought to know. I've seen enough serious and costly accidents resulting from their misuse. If these accidents are to be avoided definite precautions must be taken.

Some of these are:

1. Training of drivers in the safe use of trucks and a driver's license test must be mandatory.

2. Traffic rules similar to highway regulations must be followed. These should include signalling, speeding, stopping, turning, parking, etc. In addition, there must be rules for lifting, lowering and engaging material. Unless such a program is established there will be accidents . . . and serious ones involving personal injury and damage to equipment and material.

3. In no case may horseplay be tolerated. I saw one clown cave in a dividing wall in a foundry when he was stunting.

4. Trucks operated from a rear platform must have waist-high guards to prevent pinching the driver in case of collision when backing up. I saw a driver break his back because the truck had no guard.

5. Trucks capable of raising loads above the operator's head should be equipped with canopy guards.

6. Trucks operated on docks elevated above railway tracks should never be used to push or tow freight cars. This is a good way to get killed.

7. Highway trailers detached from the tractor should not be loaded with power trucks unless the wheels of the tractor are blocked.

8. Drivers should never operate lift trucks with loads so heavy that steering is uncertain due to loss of weight on the rear wheels.

9. A power truck should never be left unattended unless the controls are neutralized, brakes set, ignition key removed or connector plug pulled, and fork or platform set down.

10. Loading to excessive height should not be permitted.

11. A lift truck carrying a load should back down a ramp with the load following and should go upgrade with the load ahead.

12. Drivers must always look in the direction of travel even when backing up for a short distance.

It is important to remember that the operation of a lift truck differs basically from that of an automobile. A lift truck is steered with the rear wheels; steers more easily loaded than empty; is driven backward as much as forward; and is steered with one hand, the other hand being used to operate controls.

The Accident Prevention Department of the Association of Casualty and Surety Companies (60 John St., New York 38) has published a 17-page booklet, "Your Guide to the Safe Use of Power Trucks." This booklet is available on request.

In spite of all the safety rules, however, I can say with experience that accidents will continue with power trucks unless the drivers have proper mental attitudes regarding safe practices.

On the public highway we experience the same thing. Young men can handle a car with more skill and they have better reflexes and reaction time than older persons but the greatest number of accidents are caused by them. This is reflected in the insurance premium for drivers under 25 years of age. This may be called the recklessness and daring of youth.

I have seen this same recklessness . . . . completely uncalled for . . . . in industrial truck drivers, and I believe it is the greatest cause of industrial truck accidents. I know one plant that hired female drivers during the war and they were so pleased with the accident record and care of equipment that it will continue using women drivers.

Rules yes! But most important—a change of attitude.

for the asking

fork lift truck Operator's book, 24 pp, covers fundamentals, preventive maintenance, safety and basic materials handling. Cartoon technique employed for easy reading. *Hyster Co.*

CIRCLE NO. 81, PAGE 7-8

Shell processing machinery bulletin 6000, 16 pp, includes data on one to four-pattern machines. Latter has second curing furnace so cope and drag shells can be produced in matched pairs when set on alternate patterns. *Beardsley & Piper Div., Pettibone Mulliken Corp.*

CIRCLE NO. 82, PAGE 7-8

fork lift truck Fork lift truck case histories in foundries presented in four reports showing equipment in action with explanation of services, benefits, and equipment used. *Baker-Raulang Co.*

CIRCLE NO. 83, PAGE 7-8

fork lift truck Fork lift truck brochure, 6 pp, contains standard specifications for line. Thirteen models pictured, details 32 specifications for each model. *Towmotor Corp.*

CIRCLE NO. 84, PAGE 7-8

Nickel alloyed cast irons guide to the selection of engineering irons, 28 pp, discusses characteristics and applications, design factors, specifications and typical applications, metallurgy and mechanical properties as well as physical properties and fabrication. *International Nickel Co., Inc.*

CIRCLE NO. 85, PAGE 7-8

Bushed roller chain book 2454, 16 pp, contains product applications, specifications. Made with straight or offset sidebars. *Link-Belt Co.*

CIRCLE NO. 86, PAGE 7-8

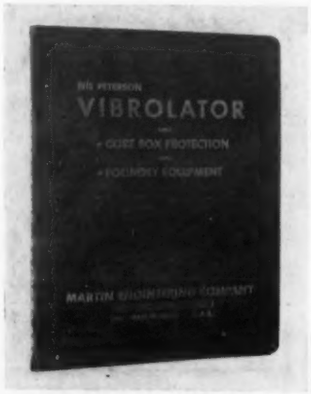
lift truck fork Materials handling catalog, 132 pp, includes riding and walking type electric trucks. Specifications and construction features shown on all models. *Lewis-Shepard Products, Inc.*

CIRCLE NO. 87, PAGE 7-8

Liquid parting compounds discussed in 2 pp bulletin. Covers development from the blending of tallow and fuel oil. *American Colloid Co.*

CIRCLE NO. 88, PAGE 7-8

High-speed vibrator catalog, 54 pp, lists entire line used for freeing pattern plates from molds and keeping sand feeding freely. Sand arrester



tubes, bushings, core box sealers and other foundry accessories are described. *Martin Engineering Co.*

CIRCLE NO. 89, PAGE 7-8

Chromium-nickel-manganese stainless steels types 202, 204 and 204L are

outlined in data sheet, 8 pp. Gives information on intergranular corrosion, mechanical properties, analysis and stress rupture properties. *Allegheny Ludlum Steel Corp.*

CIRCLE NO. 90, PAGE 7-8

Foundry sand stabilizer "Lin-O-Cel" described in bulletin 8170, 4 pp. A finely ground cellulose material which is said to prevent such defects as rat-tails, buckles and scabs. *Archer-Daniels-Midland Co.*

CIRCLE NO. 91, PAGE 7-8

fork lift truck LP-gas fuel systems for fork lift trucks covered in data sheets for 14 models. Includes advantages, specifications and performance figures. *Hyster Co.*

CIRCLE NO. 92, PAGE 7-8

Cast iron inoculant alloy "SMZ" is explained in bulletin F-4604C, 14 pp. What it is and what it does is explained with photomicrographs, photos, charts and tables. *Electro Metallurgical Co. Div., Union Carbide & Carbon Corp.*

CIRCLE NO. 93, PAGE 7-8

Mix-muller data bulletin 517, 22 pp, explains proper sand preparation, production arrangements and equipment specifications. Also covers sand recovery system, dust collector, aerators and cooling hood. *National Engineering Co.*

CIRCLE NO. 94, PAGE 7-8

fork lift truck Job study on materials handling featuring fork lift trucks is contained in 4 pp brochure. Photos show equipment in use with description of operations. *Towmotor Corp.*

CIRCLE NO. 95, PAGE 7-8

Shell molding newsletter no. 13, 6 pp, contains case histories on process. Illustrated with plant pictures. *Durez Plastics Div., Hooker Electrochemical Co.*

CIRCLE NO. 96, PAGE 7-8

Refractory specialties catalog 101, 16 pp, includes ramming mixes, mortars, patches, castables and plastics. Also features 2 pp reference chart. *Mullite Refractories Co.*

CIRCLE NO. 97, PAGE 7-8

Foundry jacket line is covered in bulletin, 6 pp. Five types available, self-aligning and adjustable. Made in any taper and length wanted. *Products Engineering Co.*

CIRCLE NO. 98, PAGE 7-8

Automatic hardness tester with speeds to 1000 per hour is covered

in 4 pp bulletin, Classifies into three categories. *Wilson Mechanical Instrument Div., American Chain & Cable Co., Inc.*

CIRCLE NO. 99, PAGE 7-8

Optical instrument booklet shows ways to simplify and speed manufacturing and inspection operations. Covers magnifiers, microscopes, wide-field tubes, macroscopes and comparators. *Bausch & Lomb Optical Co.*

CIRCLE NO. 100, PAGE 7-8

Industrial blowers featuring circle turbo design are featured in 4 pp brochure. Included are roof units, exhaust fans, material handling exhaustors and duct fans. *General Blower Co.*

CIRCLE NO. 101, PAGE 7-8

Firebrick bulletin 551, 8 pp, contains complete line of firebrick, high alumina and special brick. Has seven special technical data tables and 150 recommendations for the line. *J. H. France Refractories Co.*

CIRCLE NO. 102, PAGE 7-8

Electric and hand hoists are presented in pocket-size 14 pp circular which also includes related overhead materials handling equipment. Circular 163 contains descriptions and basic specifications of the line. *Chisholm-Moore Hoist Div. Columbus McKinnon Chain Corp.*

CIRCLE NO. 103, PAGE 7-8

Atmospheric pollution control of fumes from electric steel melting furnaces is included in bulletin which includes general discussion of cloth filtration for cleaning electric furnace ventilation air. Photos of installations are shown. Operating data also included. *Wheelabrator Corp.*

CIRCLE NO. 104, PAGE 7-8

Die-casting machines, high-pressure hydraulic, are outlined 8 pp bulletin. Covers four models for hot chamber casting of zinc, lead, and tin; and cold chamber casting of aluminum, brass and magnesium. *Cleveland Automatic Machine Co.*

CIRCLE NO. 105, PAGE 7-8

Acrylic clear plastic in spray can for sealing wood and metal against water, acids, vapors or salts is described in 2 pp bulletin. *Crown Industrial Products Co.*

CIRCLE NO. 106, PAGE 7-8

Investment casting catalog F30017, 44 pp, contains flow chart of process, what to consider in investment castings, designing tips, typical castings, quality control and inspection and properties of "Haynes" alloys. *Haynes Stellite Co. Div., Union Carbide & Carbon Corp.*

CIRCLE NO. 107, PAGE 7-8

Foundry equipment catalog 69A, 58 pp, contains foundry flasks, flask accessories, conveying equipment and accessories. *Sterling Wheelbarrow Co.*

CIRCLE NO. 108, PAGE 7-8

Electrode data book NH-504, 24 pp, includes A.W.S.-A.S.T.M. arc welding electrode specifications, how to estimate electrode consumption, summary of welding symbols and factors in selecting electrodes. *National Cylinder Gas Co.*

CIRCLE NO. 109, PAGE 7-8

Conversion chart for engineers contains common conversions as well as many difficult to locate in reference manuals. *Precision Equipment Co.*

CIRCLE NO. 110, PAGE 7-8

Stainless steel casting booklet, 28 pp, gives detailed information on corrosion and heat resisting castings. Technical data section includes physical properties and chemical composition-standard analysis. *Allegheny Ludlum Steel Corp.*

CIRCLE NO. 111, PAGE 7-8

Epoxy pattern materials described in bulletin T-24. Resins formulated for foundry pattern equipment. Contains step-by-step procedure for use of epoxies in casting of patterns and core boxes. *Houghton Laboratories, Inc.*

CIRCLE NO. 112, PAGE 7-8

Colored hardeners for epoxy resins covered in 2 pp bulletin. Color used as quality control, streaks and striations indicate improper mixing. Non-dermatitic, hardens at room temperature. *Furane Plastics, Inc.*

CIRCLE NO. 113, PAGE 7-8

Plastic aluminum for repairing damaged castings and wood and metal patterns described in bulletin. Applied without heat, dries within 3 hr. Withstands temperatures to 600 F, may be drilled, filed, tapped or threaded. *Magic Iron Cement Co.*

CIRCLE NO. 114, PAGE 7-8

Plastic tooling brochure, 8 pp, covers epoxy and phenolic resins. Contains applications, construction, and advantages. Also lists curing methods and hardeners. *Marblette Corp.*

CIRCLE NO. 115, PAGE 7-8

Temperature control bulletin 106 explains model "L-1S" designed for uses where temperature setting must be frequently and easily changed and not exceeding 1000 F. *Burling Instrument Co., Inc.*

CIRCLE NO. 116, PAGE 7-8

Epoxy resin summary chart outlining physical and electrical properties of 25 different systems includes pot life and properties of cured samples at 80 to 85 F. *Permacel Tape Corp.*

CIRCLE NO. 117, PAGE 7-8

Thickening agent for epoxy resins and polyesters, and mold lubricant, "Santocel", a chemically inert, heat stable, insoluble, free flowing silica aerogel is covered in 10 pp. Lists major applications, physical characteristics and chemical analysis. *Monsanto Chemical Co.*

CIRCLE NO. 118, PAGE 7-8

Zirconium facts are featured in "More Zr Facts" which gives historical data as well as production processes and uses. *Carborundum Metals Co.*

CIRCLE NO. 119, PAGE 7-8

Brinnell tester, air-operated, discussed in bulletin No. 52, 4 pp. Covers descriptions, function and operating principles of two models. *Tinius Olsen Testing Machine Co.*

CIRCLE NO. 120, PAGE 7-8

dietrich's corner

by h. f. dietrich

Every so often someone sets up a howl for socialized medicine. Various schemes are presented to cure the ills of man at taxpayers expense. I am sure that the proposals are sincerely made by individuals who believe naively in man's altruistic nature. However, although the ethics of most practicing physicians cannot be questioned, once in a while we find a dubious character among them.

In 1924, Wisconsin had a compensation law that was somewhat like socialized medicine. If you were injured on the job you went to a designated doctor for treatment, unless the company for which you worked kept a staff doctor on the premises.

I was working one of three benches at the time, and my bench partners were working on a system to beat a blackjack game that was flourishing on the south side of Milwaukee. After much noon hour experimental work, using horse shoe chill nails for money, they gave the system a tryout with the chips down. Sporting a flashy necktie, a lavender shirt, and a new Stetson, my partner came into the shop Saturday morning and announced that he was never going to work again. This left me to handle an eighteen square steel flask by myself.

The job I had matched in a soft match didn't pay enough to clamp before rolling over, so I proceeded to flop the job without clamps. As a result, I pulled the muscles in my left shoulder. By Monday morning my left arm was almost useless. (Also, by Monday morning, my bench partners were back on the job trying to work off a hundred and fifty dollars worth of I.O.U.'s that they had accumulated over the week-end.)

I went to the compensation doctor, as instructed, and explained the pulled ligament. He looked into my ears, down my throat, poked me here and there and came up with the profound observation that I had the flu and would have to go to bed for a week. He would visit with me daily.

I'm not antisocial, but this pill-pusher wasn't my type. He couldn't play skatt, and he smelled like ether. After some pointed argument, he relinquished his claim to a week's housecall money and despite my protest placed me under a heat lamp.

After adjusting the heat lamp until it burned the back of his hand, he must have gone out to lunch. No amount of yelling could bring him back to the soundproof torture cell in which I broiled. I'll say this for his treatment, it was effective. One, and only one, was needed. After that, any painful muscle straightened itself out rather than return to that broiling process.

That stethoscope engineer had an influenza fixation. He felt that everyone in the area had need of a rest, and he thought it was his duty to the public to prescribe it—and draw housecall fees.

In the main bay of our foundry we had a dry-floor molder by the name of Blackie. He was not the effeminate type. His command of profanity would turn a wind-jammer skipper green with envy. Blackie felt that it was unethical to use hand signals to the craneman when you could converse with him by bellowing. And cranemen felt that the sooner they finished a lift for Blackie, the sooner the dry-floor would return to a peaceful and quiet state.

One day, Blackie called for the fifteen-ton hook to pick up a light chain. While guiding the chain off the floor, his thumb slipped through a link, and Blackie was ten feet above the floor before he had time to draw enough breath for the stream of profanity he had thought of on the way up. He went to the influenza expert with a sprained wrist and a pulled shoulder socket.

The nature of the injury made no difference to the man of medicine. He tried to put Blackie to bed with the flu. This must have been an interesting experience for the practicing physician. The character reading Blackie gave him must have scorched his sheepskin.

Blackie resorted to the homeopathic remedy of equal parts of Old Crow and Old Grand Dad and was back on the dry-floor the next day.

Careless diagnosticians of this breed would find it difficult to build a private practice. They can only exist in a subsidized climate of tax funds; in the impersonal, political control of socialized medicine.

Time Spent on Cleaning Scrap Returns Dividends

Time and effort spent in making certain that sand, dirt and oil have been removed from risers, gates and runners will pay off in longer lasting crucibles and more efficient melting.

Contaminators left in the scrap cause an increase in the gas content of the new metal being melted, states Electro Refractories & Abrasives Corp., Buffalo, N. Y. The firm says that the chemical action induced by slagging elements add to the wear on the crucible wall. Sand is a prime enemy since it combines with the oxides in the metal surface.

A light coating of oil is not too significant as it will be vaporized in the flame-type crucible. If coatings are heavier they should be wiped off. Good practice before melting scrap is to first melt a single ingot in the crucible. This creates a pool of molten metal in which to melt the scrap, making for better conductivity and faster melting.

N.Y.U. Sponsors Series on Vacuum Metallurgy in June

American and foreign specialists will discuss vacuum metallurgy in a series of 25 lectures at New York University, June 10-14, sponsored by the University's department of metallurgical engineering and the N.Y.U. office of special services to business and industry.

Among the topics to be discussed will be vacuum pumping systems, thermodynamics, specific processes, the designs and operation of arc and induction melting systems, and applications of vacuum processed materials.

Dr. R. F. Bunshah, associate engineering scientist, N.Y.U. points out that "One of the most thorough and practical means of bringing engineers up to date in the field is to gather together the leading authorities and have them present the information directly."

A.S.T.M. Releases Book

The 1956 American Society for Testing Materials *"Methods for Chemical Analysis of Metals"* is now available. This is the first complete revision of the volume since 1950. It contains all A.S.T.M. methods for chemical analysis of ferrous and non-ferrous metals and alloys, including spectrochemical procedures and contains 640 pages.

local foundry news

Northeastern Ohio Hopes to Stimulate Competition in Educational Activities

Three-way program directed at local members, other chapters

A three-way program to stimulate interest in foundry educational activities has been developed by the Northeastern Ohio Chapter of the American Foundrymen's Society. Details on its education program are being sent to each member of the Northeastern Ohio Chapter and to non-member companies. To encourage competition between the 46 chapters of AFS, an outline of its program is being sent to each chapter secretary in the society.

The letter outlines the chapter's monthly technical program and the benefits of the Kennedy Memorial Apprenticeship Contest. It also lists such special activities as participation in a Cleveland television program revealing the contributions made by foundries to the national progress and the three-day sand school sponsored by the Harry W. Dietert Co. at Case Institute of Technology.

Also discussed in the letter is the importance of vocational guidance for high school students and the necessity of attracting college-trained men to the industry. Suggestions for improving this plan include plant visitations, invitations to foundry instructors to attend chapter meetings and visits to schools.

Publicity is cited by the chapter to be essential not only within the chapter but also to let others know the progress being made by foundries.

Participation is urged with other groups such as the Northeastern Ohio Chapter's activities with the Cleveland Technical Society Council and local high schools.

The Northeastern Ohio Chapter has divided its educational committee in sub-committees for each of its activities in an effort not to neglect any portion of the overall program.

MILWAUKEE CHAPLET PHOTO

Western New York Chapter's nominating committee met in February to name officers for the coming year. Committee members are: front row, J. M. Clifford, Atlas Steel Casting Co.; A. H. Suchow, Symington-Gould Corp.; L. Greenfield, Samuel Greenfield Co. Back row: Chapter President Milt Emery, Buffalo Pipe & Foundry Co.; J. McCallum, McCallum Bronze Co.; E. W. Duetchlander, Worthington Pump Corp.; John Wark, Wark Foundry Equipment Co.; William Oliver, American Radiator & Standard Sanitary Corp. Ferrous and non-ferrous round-table shop talks were also conducted at the meeting. Members of the panel were Phillip S. Savage, Jr., McCallum Bronze Co., Inc.; Harry Ahl, Samuel Greenfield Co.; Ezra Kotzin, Pratt & Letchworth Co.; Loren Wright, Symington Gould Co.

Philadelphia Adds Prizes to Kennedy Apprentice Contest

Philadelphia's AFS Chapter sponsored a local apprentice contest in addition to participating in the AFS 1957 Robert E. Kennedy Memorial Apprentice Contest. In divisions where three or more Philadelphia area shops are participating and there is a total of four or more entries, Philadelphia foundries were invited to compete for the Chapter awards. Prizes of $20, $10 and $5 will be awarded for first, second and third prizes in each division.

DEBEVOISE-ANDERSON CO. PHOTO

Prof. Taylor, Massachusetts Institute of Technology was the featured speaker at the February meeting of the **New England Chapter.** He discussed chemical and mechanical properties of clay and sand. Clyde Armstrong, chapter chairman, is shown on left greeting Prof. Taylor prior to meeting.

Two technical sessions were held at the February meeting of the **Northeastern Ohio Chapter.** More than 200 persons heard Howard H. Wilder, Vanadium Corp. of America speak on ***"Practical Cupola Operation."*** He emphasized the importance of proper cupola operation and control and covered such points as bed height, amount of blast air, the effect of charge permeability, and results to be expected from alloy additions. Joseph W. Tierney, Plastic Tooling Div., Houghton Laboratories, Inc., spoke to a separate technical session sponsored by the patternmakers' division of the Chapter. Tierney, shown in photo, discussed ***"Plastic Tooling for Foundries."***

MILWAUKEE CHAPLET PHOTO

A British foundry observer, D. H. Butler, Phosphor Bronze Co., Ltd., Birmingham, England, was a guest of the **Milwaukee Chapter** at its January meeting. Butler is studying manufacturing processes and metallurgy in the United States and Canada under a fellowship. Shown in photo are left to right, D. Brozoski, D. H. Butler, and E. Chybowski.

A foundry sand panel discussion was held by the **Texas Chapter** at its February meeting. Panel members l to r are: King C. Tetley, Nibco of Texas, Inc.; moderator John H. Kimes, Jr., Lufkin Foundry & Machine Co.; F. W. Jacobs, Texas Foundries, Inc., and Ross Williams, East Texas Steel Casting Co., Inc.

Members of the **East Texas Section** of the Texas Chapter in February heard William F. Hipple, Ajax Electrothermic Corp., discuss *"Induction Melting of Ferrous and Non-Ferrous Metals."* Hipple is shown at the left with Ross William, chairman of the East Texas Section.

Clark Speaks at Utah Chapter

Members of the AFS Utah Chapter and the American Society for Metals met jointly in Salt Lake City in February to hear Kenneth L. Clark, International Nickel Co. discuss ductile iron.

Saving on snagging and cut-off operations was explained to **Oregon Chapter** members at the February meeting. Speaker for the evening was John A. Mueller, Carborundum Co., who said grinding wheels operate most efficiently when used at maximum speeds consistent with safety.

Discuss Gating at Timberline

Vertical gating principles were discussed at the February meeting of the Timberline Chapter held in Denver, Colo. Forty-nine members saw a movie on the subject prepared by Battelle Memorial Institute.

"Quality Control in the Foundry" was outlined at the February meeting of the **Tri-State Chapter** by Robert Jacoby, St. Louis Coke & Foundry Supply Co. Shown in the picture are, left to right, Ed. O'Brien, chapter vice-chairman, speaker Robert Jacoby, and chapter secretary Emmet Hines.

California Hears F.E.F. Head

What modern industry expects from students and how schools could expand their curricula to meet industry's needs were discussed on a California tour in February by James H. Smith, general manager, Central Foundry Division, GMC, and president of the Foundry Educational Foundation. Smith spoke before engineering, management and educator groups in Los Angeles, Berkeley and San Francisco.

Quad-City Chapter's February meeting featured a talk on *"Mechanization of Large and Small Foundries"* by O. H. Kraft, Westover Corp. Kraft, shown on left is being welcomed by William Salzman, technical chairman of the meeting.

Timberline Hears O. C. Bueg

Casting problems from the patternmaker's viewpoint were presented at the January meeting of the Timberline Chapter held at the Oxford Hotel, Denver, Colo. O. C. Bueg, Arrow Pattern and Engineering Co., Erie, Pa., was the speaker, his topic was *"Patternmaking, Wrinkles and Problems."* Bueg recommended that patternmakers belong to the American Foundrymen's Society and that they use the Society's book *"Pattern-Maker's Manual."* Darrell C. Durant, Chapter Chairman presided. D. C. Card, Vice-Chairman, served as the technical chairman.

Core processes, their advantages and disadvantages, were discussed at the January meeting of the **Central Ohio Chapter** by Warner B. Bishop, Archer-Daniels-Midland Co. Core making processes covered were conventional oil sand, resin, shell, air set and gas set. Slides illustrated the talk.

Orloff Talks at Cincinnati

More than 100 members and guests attended the February dinner and meeting of the Cincinnati Chapter and heard Joe Orloff, Central Foundry Div., GMC, discuss pouring effects on scrap. Orloff stressed the need for a careful and detailed layout of the gating system.

An evaluation of four major core making processes was made at the February meeting of the **St. Louis Chapter** by O. J. Myers, Reichhold Chemicals, Inc. The chapter reached its membership goal of 268 members. Membership Chairman F. J. Boeneker, left, accepts an application from 268th member Frank Niehaus, Reichhold Chemicals, Inc., while Chapter Chairman John O'Meara looks on.

Student Meeting at Rolla, Mo.

The Missouri School of Mines Student Chapter of the American Foundrymen's Society and the AFS St. Louis Chapter held a joint meeting Feb. 6 at Rolla, Mo. Eighty students and nine members of the St. Louis Chapter attended. Plans were discussed for the annual field trip to St. Louis in May. Robert Robinson, Central Foundry Div., GMC, discussed shell molding of crankshafts at the Danville plant. St. Louis Chapter members attending were Jack Bodine, John O'Meara, Fred Boeneker, Vince Boemer, John Ong, Ralph Peterson, Bob Woods, Walter Zeiss, and Jack Thompson.

Northern California Chapter's January meeting centered around exothermic materials and their application in the foundry. Micheal Bock II, Exomet, Inc., Conneaut, Ohio, was the speaker. Shown in photo on left is Clyde Wyman, Vulcan Foundry Co., Oakland, Calif. with speaker Bock.

San Antonio Section Meets

Shifts in snap-flask molding, their causes and cures, were discussed at the February meeting of the San Antonio section of the AFS Texas Chapter. Thirty-one members and guests attended.

Society of Die Casting Engineers at the February meeting in Detroit, heard B. L. Meredith talk on *"Production of Quality Die Castings."* Meredith, research metallurgist with Federated Metals Div., American Smelting & Refining Co., is a member of the American Foundrymen's Society Light Metals Division Die Casting Committee, he discussed common causes of defective die castings and methods of correction. His lecture was supplemented with illustrations.

G.I.F.S. Groups Elect

Officers were elected recently for three management and cost groups of the Gray Iron Founders' Society. The groups and officers: Philadelphia-Reading management and cost group, chairman, R. J. Kuntz, Aldrich Pump Co., Allentown, Pa.; vice-chairman, W. S. Thomas, Emmaus Foundry & Machine Co., Emmaus, Pa.; secretary-treasurer, I. J. Rentz, Textile Machine Works, Reading, Pa. Buffalo, N. Y. management executives group, chairman, John J. Bingenheimer, Dobbie Foundry & Machine Co., Niagara Falls, N. Y.; vice-chairman, Eugene F. Smith, A. L. Swett Iron Works, Medina, N. Y.; secretary-treasurer, Robert F. Pohlman, Pohlman Foundry Co., Inc., Buffalo, N. Y. Ontario, Canada management and cost group, chairman, G. B. Winkworth, Toronto Foundry Co., Ltd., Toronto, Canada; vice-chairman, J. P. Lubenkov, Link-Belt, Ltd., Toronto, Canada; secretary, W. J. L. Hutchison, John T. Hepburn, Ltd., Toronto, Canada; treasurer, A. Reyburn, John Bertram & Sons Co., Ltd., Dundas, Canada.

Weber Speaks At Ontario

Making foundries a better place in which to work and the improving of community relations were discussed at the January meeting of the Ontario Chapter meeting at the Royal Pork Hotel, Toronto. Principal speaker was H. J. Weber, director of safety, hygiene and air pollution control for the American Foundrymen's Society. Weber stated that because stricter municipal and provincial laws are being adopted that air pollution and hygiene control will have to be installed by foundries. Weber recommended that foundries notify the

community when steps were being made to control noise, dust and smoke. This, he said, will lead to improved community relations which are an important phase of the foundry and its environment.

WALTER V. NAPP PHOTO

Pittsburgh Chapter members at the January meeting heard Clyde A. Sanders, American Colloid Co., Chicago, discuss *"Casting Finish, Tolerance and Precision."* Ten suggestions were made to foundrymen to follow in selecting various processes. Shown in the photo are left, George V. Cruickshank, Peninsula Grinding Wheel Co., Pittsburgh, and Richard D. Baker, Pittsburgh Coke & Chemical Co., Pittsburgh. Both are Chapter greeters.

Quad City Chapter Discusses Deere's Water Cooled Cupolas

Development of conversion of standard cupolas to the water-cooled type was discussed at the January meeting of the Quad City Chapter held at the Fort Armstrong Hotel, Rock Island, Ill. Speaker for the evening was J. McConville, John Deere Waterloo Tractor Works. McConville said that all cupolas in the Deere Waterloo tractor works had been converted to the water-cooled type and that it is only necessary to operate two No. 9 cupolas on a 16-hr basis to produce 750 tons. He said that the melting rate on water-cooled cupolas is 25 per cent greater than on standard types and that refractory consumption dropped from 25.7 lb per ton of melt to 12 lb per ton of melt. Other results listed by the speaker were a greater and more uniform carbon pickup, a decrease in limestone consumption and slag runs held close to neutral.

New York Panel Will Discuss Modern Foundry Practices

A panel discussion on "Modern Foundry Practices" was held March 20, at the Hotel Statler, Buffalo, N. Y. under the auspices of the Society of Automotive Engineers.

Topics covered were factors to consider when purchasing automatic core machines, problems arising with the use of hot blast cupolas, automation in materials handling, reclaiming of sand, automation in the cleaning room, scrap, air pollution problems, new types of automatic molding machines and shell molding.

The panel consisted of George Johnson, Chevrolet Tonawanda Foundry

Div., GMC, Tonawanda, N. Y., panel leader; Leonard Wood, Chevrolet Tonawanda Foundry Div., GMC, Tonawanda, N. Y.; John Donaldson, Grindle Div., C. O. Bartlett & Snow Co., Cleveland, Ohio; Lyle Clark, foundry research, Armour Research Foundation, Chicago; Willard Parker, Chevrolet Tonawanda Foundry Div., GMC, Tonawanda, N. Y.; C. Dale Evans, Central Foundry Division, GMC, Saginaw, Mich.; A. M. Clark, Ford Motor Co., Dearborn, Mich.; Charles Collins, Pontiac Foundry Div., GMC, Pontiac, Mich.

Ford's Water-Cooled Cupolas Explained at Montreal Meeting

Water-cooled cupolas were discussed at the January meeting of the Eastern Canada Chapter in Montreal by W. Dawson, Ford Motor Co. Dawson said that Ford's iron melting facilities consisted of seven cupolas with six used during normal operations. Advantages of the water-cooled cupola as listed by Dawson are reduced refractory, reduced maintenance and operating costs and additional control to produce a wider variation of quality and high strength irons.

Cupolas are externally water-cooled. The walls consist of vertical steel plate 1 in. thick; there is no lining above the well. Four, 6-in. water-cooled copper tuyeres project 10 in. beyond the lining. The height from the top of the tuyeres to the charging door is 26 ft. Just below the charging door is an expansion joint in the shell and immediately below is the start of the water-cooling.

Northwestern Pennsylvania Hears Discussion on Sand

Sand control was discussed at the January meeting of the Northwestern Pennsylvania Chapter by E. E. Woodliff, Foundry Sand Service Engineering Co., Detroit, Mich. The speaker said that confusion often exists between the purchasing department and foundry foremen as to sand specifications. He also covered the importance of mulling, clay content, and tempering sand. Woodliff said one common fault of core making was the use of too much oil.

Magnesium Discussed at Texas

Sand casting of magnesium was discussed at the January meeting of the Texas Chapter held at the Statler-Hilton Hotel, Dallas. M. E. Brooks, Dow Chemical Co., Bay City, Mich. was the speaker; 102 attended. Brooks stated that at present there are about 75 foundries casting magnesium in the United States. Only two of these confine their production to non-military production.

General melting practices were discussed as well as molding sands, gating and risering. Brooks emphasized that the cost of a magnesium casting is affected considerably more by the efficiency of operations than by the cost of the material.

questions and answers

Misery loves company so why not share your castings problems with us? MODERN CASTINGS invites you to "stump the experts" with tales of gremlins that are haunting your scrap piles. If any of you readers have better answers to the questions below, write the editor.

casting specs

We purchase a large number of castings and have established a number of specifications for them to meet. One term in our specs reads "that the casting be commercially clean and sound." This term is so general that neither purchaser nor supplier is quite sure of its exact meaning. Could you suggest a more specific statement that would be mutually understood by both parties involved?

American Society for Testing Materials Specification A 48, a general specification for gray iron castings, has a paragraph that would probably fulfill your requirements. It reads: "The castings shall conform substantially to the dimensions on the drawings furnished by the purchaser or to the dimensions predicated by the pattern supplied by the purchaser, if no drawing is provided. The casting shall be free from injurious defects. Surfaces of the castings shall be free from burnt-on sand and shall be reasonably smooth. Runners, risers, fins and other cast-on pieces shall be removed. In other respects, the casting shall conform to whatever points may have been specifically agreed upon between the manufacturer and purchaser." If there are specific needs as related to a definite casting which are especially important, the above general statement can be supplemented by a statement delineating these requirements.

who pays the freight?

As a jobbing foundry how do we bid on a casting order on a delivered basis? How do we protect ourselves from high cost of small lot deliveries?

Probably the fairest and most satisfactory approach is to quote the customer with a fixed freight allowance, per cwt of castings, included as a specific part of the quotation. This freight allowance will be based on a mutually satisfactory minimum shipment and mode of carrier. The allowance is deducted from the casting bill sent to the customer. Castings are shipped to the customer collect. With this arrangement the customer will automatically pay the higher freight rate if he needs special shipments of small quantities of castings.

crumbly cores

We are casting leaded tin bronze bushings and are experiencing difficulties in making satisfactory sand cores. Our core mix contains silica sand plus 1/2 per cent linseed oil, 1 per cent coregum and 1/2 per cent bentonite. The cores, measuring about one in. in diameter and 12 in. long, are baked at 450 F. They are painted with a core wash containing 4 per cent aluminum and 2 per cent dextrine and then torch dried. The resulting cores are so weak and crumbly that they are constantly being damaged during handling. If strength is increased with extra oil or cereal binder then core blows haunt us. Any suggestions?

The strength and permeability of your cores will be improved if you use a mix containing 32 quarts of silica sand (85 AFS grain fineness), 16 quarts of molding sand, one quart of linseed oil, and 1 to 2 per cent moisture. Bake cores at 400 F and coat with a plumbago type core wash using either kerosene or alcohol as the carrier. If kerosene is used the core should be re-dried.

I understand you do casting! Just what studio are you with . . . MGM . . . RKO . . .

Duncan Forbes, AFS Past President, Dead at 60

■ Duncan P. Forbes, board chairman of Gunite Foundries Corp., Rockford, Ill., and past president of AFS, died February 15 of a heart ailment at the age of 60.

Mr. Forbes came from a long line of foundrymen; his great grandfather was one of the pioneers in the production of malleable iron in America.

A 1919 graduate of Yale University, Mr. Forbes took post graduate

D. P. Forbes

work in metallurgy and spent some time in the laboratory of the late Professor Enrique Touceda in Albany, N. Y. In 1921 he entered the employ of the Rockford Malleable Iron Works, becoming works manager in 1925. As a result of research work directed by him, a process of producing high test gray iron was developed and a separate company, The Gunite Corp., was organized in 1928 with Mr. Forbes as president. This became the Gunite Foundries Corp. in 1932.

Duncan Forbes served as a director of American Foundrymen's Society from 1937-1940, he was vice-president in 1941-42 and president in 1942-43, serving three additional years on the board. He had been active in the organization of the Northern Illinois-Southern Wisconsin Chapter of AFS and served on its board of directors.

Mr. Forbes was formerly a director of the Malleable Iron Research Institute, now the Malleable Founders' Society, a member of the American Society for Metals and the Society of Automotive Engineers.

In World War I, Mr. Forbes served as a Navy pilot. He was also a pioneer air mail pilot.

He is survived by his wife, Mary, and four sons. The family has suggested contributions to the Rockford Memorial Hospital or the Heart Fund, in lieu of flowers.

foundry facts

Fork Lift/Operator's Guide

Maximum performance from fork lift trucks depends upon skilled operators. The following explanation of principles and operating instructions recommended by fork lift manufacturers will serve as a guide for training better operators.

Fork Lift Principles

Fork lift trucks are designed on the principle of a teeter-totter. On the one side of the fulcrum is the load which is carried on the forks. On the other side is the counterweight which offsets the weight of the load. It is possible to increase the load center by decreasing the weight of the load or to increase the load by decreasing the load center. The closer to the fulcrum an operator places the load, or the farther away he can place the counterweight, the more load can be carried. However, the maximum capacity of the truck as rated by the manufacturer must not be exceeded.

The force exerted by a fork truck on the floor varies at different speeds, loads and total weight distributions. It also changes with the number of wheels, wheel base and other variables. By adding or subtracting attachments or accessories the capacity rating of the trucks is changed.

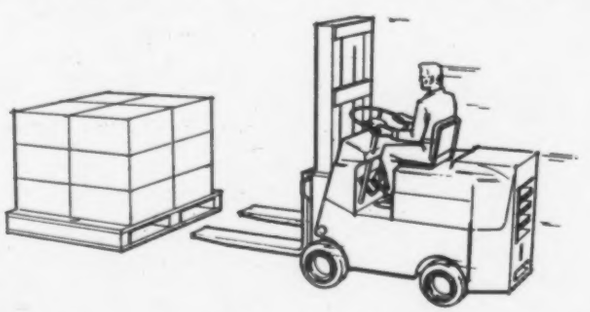
A lift truck is often driven in reverse as much as in forward gear. A lift truck operator often drives with one hand, the other is used to operate the controls.

Loading

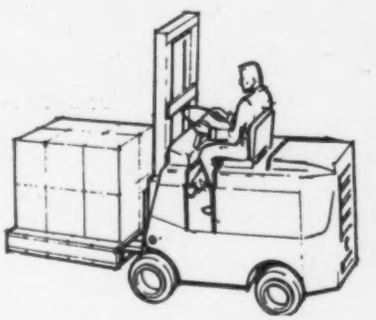
Always keep loads within the rated capacity. Lift trucks are rated in pounds of capacity plus size of load. A 2000 lb truck at 15 in. load centers means that the truck's maximum capacity is a load weighing 2000 lb with the center of the load being 15 in from the heel of the forks or a load 30 in. wide. Every operator should be familiar with the relative maximum load limits. A typical load limit table for a 2000 lb truck:

Length of Load	Load Center	Maximum Load
30 in.	15 in.	2000 lb.
36	18	1800
42	21	1650
48	24	1500

Reduce load capacities when traveling over uneven surfaces or down grades. Forks should be spaced as wide as possible and equally spaced from the center stringers of pallets. When engaging pallets, keep the forks level and



Forks should be spaced in pallets at equal distance from center stringers.



Keep loads low as possible and secure against carriage.

off the floor. Drums and barrels should be picked up in an upright position if the ribs are large enough. In picking up round objects such as rolls, first tilt the uprights so that the forks slide along the floor under the object to be lifted.

Steering

Steering is done with the rear wheels in fork lift trucks. Sharper turns are possible since the truck may be cramped much easier than conventional trucks, making operations easier in limited areas. Turns should be made smoothly and gradually, most beginners try to turn too sharply.

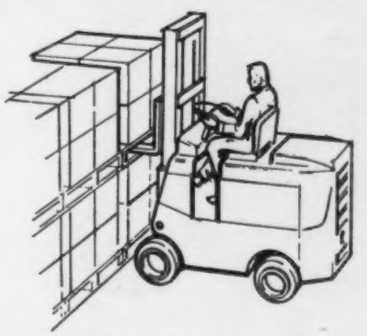
When turning corners, keep close to inside corners and start turning when the wheels meet the corner, don't start from the middle of the aisle. In turning across narrow aisles, start the turn as close to the outside of the corner as tail-swing will allow.

In exceptionally narrow aisles it is permissible to carry the load at an angle toward the direction desired in order to shorten the turning radius. However the load should be re-positioned as soon as possible. In entering railway cars, drive in at an angle. Lift trucks have free turning, and once the turn is started the truck has a tendency to turn sharper and sharper in a smaller and smaller circle. Counteract this by turning the steering wheel the other way to slow down the sharpness of the turn.

Since lift trucks are steered by the rear wheels, allow for exaggerated tail swing. Remember, a loaded truck steers easier than an empty one.

Traveling

In traveling tilt the uprights as far back as possible and raise the load only high enough to clear obstructions. Never



Tilt elevated loads forward only when fork lift truck is over the unloading position.

operate a truck when vision is hampered. If the forward view is masked, stop and travel in reverse but face in the direction of travel. Keep to the right at all times and keep feet, legs and arms within the truck. Avoid bumping and brushing other objects and never travel with a load lifted high. Drive

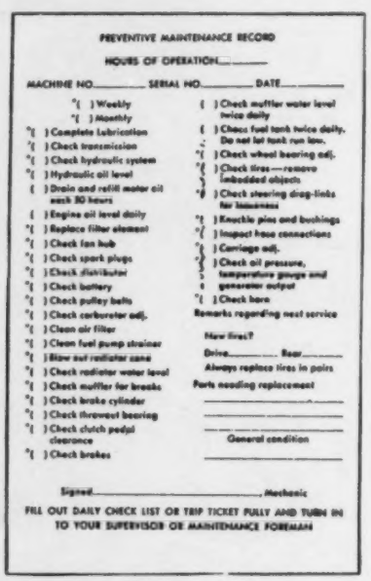
foundry facts

Fork Lift/Operator's Guide

with the load as low as possible. Drive forward on up-grades and back down for down-grades.

Proceed slowly around corners and signal at blind spots with horn. Avoid bumps or holes that might tip the truck and avoid sudden stops. When traveling unloaded, keep the forks about 4-in. off the ground. Unusually large loads may be carried by two fork trucks, one traveling forward, the other in reverse. Always keep the load against the carriage.

Speed should not exceed the maximum for complete control under the driving conditions. Slow down on wet, slippery surfaces. Do not operate the truck with wet or greasy hands or slippery shoes. When overtaking another vehicle, enough distance should be maintained to permit an emergency stop. Do not operate in dark or semi-dark buildings or at night without proper lighting.



PREVENTIVE MAINTENANCE RECORD

HOURS OF OPERATION_____

MACHINE NO._____ SERIAL NO._____ DATE_____

°( ) Weekly
°( ) Monthly

°( ) Complete Lubrication
°( ) Check transmission
°( ) Check hydraulic system
°( ) Hydraulic oil level
( ) Drain and refill motor oil each 50 hours
( ) Engine oil level daily
°( ) Replace filter element
°( ) Check fan hub
°( ) Check spark plugs
°( ) Check distributor
°( ) Check battery
°( ) Check pulley belts
°( ) Check carburetor adj.
°( ) Clean air filter
°( ) Clean fuel pump strainer
°( ) Blow out radiator cores
°( ) Check radiator water level
°( ) Check muffler for breaks
°( ) Check brake cylinder
°( ) Check throwout bearing
°( ) Check clutch pedal clearance
°( ) Check brakes

( ) Check muffler water level twice daily
( ) Check fuel tank twice daily. Do not let tank run low.
°( ) Check wheel bearing adj.
°( ) Check tires—remove imbedded objects
°( ) Check steering drag-links for looseness
°( ) Knuckle pins and bushings
°( ) Inspect hose connections
°( ) Carriage adj.
°( ) Check oil pressure, temperature gauge and generator output
°( ) Check horn

Remarks regarding next service

How tires?

Drive_____ Rear_____

Always replace tires in pairs

Parts needing replacement

_____

_____

_____

General condition

_____

Signed_____, Mechanic

FILL OUT DAILY CHECK LIST OR TRIP TICKET FULLY AND TURN IN TO YOUR SUPERVISOR OR MAINTENANCE FOREMAN

Maintenance plan adds life.

Positioning

Check the position of the drive wheels when the pallet is engaged, drive wheels may be used as a guide for positioning the pallet. Practice raising the load as the truck is nearing the stack when coasting into position, this reduces the strain on the engine and brakes. Sometimes maneuvering into position is made easier by raising the forks above the load, completing the positioning, then backing-off and lowering the forks.

To change positions in a narrow aisle, back into the turn first, the swing of the front truck without load is shorter than the tail-swing, thus with the back to the wall a change in directions is made with less movement. Watch out for unstable loads and piles and avoid severe ramming.

Keep clear of the edges of loading docks. Watch the load while raising or lowering it or when turning at other times when its stability is reduced. Come to a full stop before entering or leaving roadways or buildings. When transporting lift trucks on trailers or highway trucks, be sure brakes are set, wheels blocked and uprights lowered. When towing over rough ground or crossing tracks, slow to a crawl.

Stacking

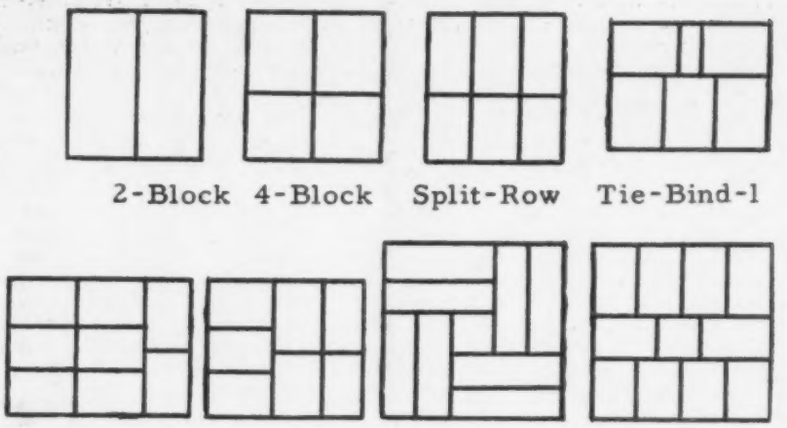
Use care in high stacking, watch for falling stacks. To stack properly, drive the truck forward in the proper gear until the load arms are entirely under the load to be lifted. Make certain that the load is centered on the arms and that it is well seated against the fact of the lifting carriage. Raise the load by pulling back on the tilt lever; allow the tilt lever to return to neutral when sufficient backward tilt of the uprights is obtained to allow safe handling of the load. Raise the load with the lift mechanism. Avoid excessive back tilt when raising loads high since the load will be directly overhead.

Excessive engine speed will not increase the speed of the hoisting mechanism. When the load reaches the desired height, allow the hoist lever to return to neutral and move the truck forward to the base of the stack on which the load is to be placed. For the beginner it is best to lift the load or release the load with the tilt mechanism because the uprights are designed to raise the load slightly when tilted backward and lower it when tilted forward. Lower loads slowly, and know the floor strengths.

Learn the various stacking techniques. In stacking irregular pieces such as castings, use strips of wood between the layers. With cartons, cases and bricks, use an interlocking system for a safer, more stable load. In stacking bags, use a woven style of piling for a compact load.

Some methods for loading pallets include the 2-block, 4-block, split row, tie binds, pinwheel and brick.

Typical Patterns for Loading Pallets



Loading patterns are needed to interlock work on pallets. Irregular pieces such as castings often require special bundling techniques.

Information for this article was compiled from operator's guides prepared by Hyster Co. and Towmotor Corp.

afs chapter meetings

APRIL

Birmingham District . . April 19 . . University of Alabama, Birmingham. Ala. *Foundry Demonstrations, Luncheon, Educational Sessions.*

British Columbia . . Apr 19 . . Pacific Athletic Club, Vancouver. M. E. Brooks, The Dow Chemical Co., *"Magnesium Foundry Practice."*

Canton District . . Apr 4 . . Elks Club, Alliance, Ohio. K. A. Kirby, Caterpillar Tractor Co., *Foremen Training. National Officers' Night.*

Central Illinois . . Apr 1 . . American Legion Hall, Peoria, Ill. M. Bock, II, Exomet, Inc., *"Exothermic and Insulating Materials."*

Central Illinois . . Apr 29 . . Pabst Blue Ribbon Hall, Peoria, Ill. *Discussion, 5 Panelists from Different Industries.*

Central Indiana . . Apr 1 . . Athenaeum Turners, Indianapolis. B. A. Lawson, Harrison Steel Cstgs. Co.; S. Hodler, Golden Foundry Co.; H. Frank, Franks Foundry; T. E. Smith, Central Foundry Div. GMC; E. O. Spahr, National Malleable & Steel Cstgs. Co.; S. G. Johnson, Jr., International Harvester Co., *"Control of Quality in the Foundry."*

Central Michigan . . Apr 17 . . Hart Hotel, Battle Creek, Mich. E. H. King, Hill & Griffith Co., *"Molding Sand and Molding Methods."*

Central New York . . *No information available.*

Central Ohio . . Apr 8 . . Seneca Hotel, Columbus, Ohio. M. J. Kellner, Trafford Foundry Div., Westinghouse Corp., *"A Practical Approach to a Profitable Foundry."*

Chesapeake . . Apr 26 . . Engineers Club, Baltimore, Md. W. S. Thomas, Emmaus Foundry & Machine Co., *"What the Customer Expects in His Castings."*

Chesapeake Southern Section . . *No meeting.*

Chicago . . Apr 1 . . Chicago Bar Assn., Chicago. Gray Iron Group: H. H. Hursen, Griffin Wheel Co., *Film Showing the "Unusual" in Foundry Practices;* Malleable & Patterns Group: R. Cech, National Malleable & Steel Castings Co., *"Gating and Risering;"* Steel & Maintenance Group: J. E. Fitzwater, International Harvester Co., Mfg. Research Dept., *"Powder Cutting & Washing Technique;" "Melting of Non-Ferrous."*

Chicago . . Apr 29 . . Chicago Bar Assn., Chicago. C. F. Christopher, Continental

Foundry & Machine Co., *"Excuses and Alibis for Poor Casting."*

Cincinnati District . . *No information available.*

Connecticut . . **Apr 23** . . Bridgeport, Conn. *Plant Visitation, Bullard Co.*

Corn Belt . . **Apr 5** . . Fireside Restaurant, Omaha, Neb. W. A. Hambley, Chas. A. Krause Milling Co., *"Casting Defects."*

Detroit . . **Apr 18** . . Tuller Hotel, Detroit.

Eastern Canada . . **Apr 12** . . Sheraton-Mount Royal Hotel, Montreal. *"The Value of Nickel in Cast Metals."*

Eastern New York . . **Apr 9** . . Panetta's Restaurant, Menands, N. Y. *Annual Joint Meeting with A.S.M.*

Metropolitan . . **Apr 1** . . Essex House, Newark, N. J., C. Hoppin, Edison Co., *"The Indian Point Story,"—Consolidated Edison's Plans for Applying Atomic Energy to the Generation of Electricity.*

Mexico City . . *No information available.*

Michiana . . **Apr 8** . . Spaulding Hotel, Michigan City, Ind. R. L. Orth, Wheelabrator Corp., *"Blast Equipment Operation & Maintenance."*

Mid-South . . **Apr 12** . . Hotel Claridge, Memphis, Tenn. L. P. Beaver, Beaver Welding Supply Co., *"Welding of Gray Iron Castings."*

Mo-Kan . . **Apr 5** . . *Plant Visitation and Panel Discussion.*

New England . . **Apr 10** . . University Club, Boston. T. E. Barlow, Eastern Clay Products Dept., International Minerals & Chemicals Corp., *"Recent Developments in Green Sand Molding."*

Northeastern Ohio . . **Apr 11** . . Tudor Arms Hotel, Cleveland. *National Officers' Night, Apprentice Awards.*

Northern California . . **Apr 13** . . Spenger's Cafe, Berkeley, Calif. M. E. Brooks, Dow Chemical Co., *"Magnesium Foundry Practice."*

No. Ill.-So. Wis. . . **Apr 9** . . Lafayette Hotel, Rockford, Ill. B. H. Taylor, Union Relations Div., B. F. Goodrich Co., *"Today's Challenge in Human Relations."*

Northwestern Pennsylvania . . **Apr 22** . . Franklin Club, Franklin, Pa. D. E. Krause, Gray Iron Research Institute.

Ontario . . **Apr 26** . . Royal Connaught Hotel, Hamilton. *Ladies' Night.*

Oregon . . **Apr 17** . . Heathman Hotel, Portland, Ore. M. E. Brooks, The Dow Chemical Co., *"Magnesium Foundry Practice."*

Philadelphia . . **Apr 12-13** . . Benjamin Franklin Hotel, Philadelphia. AFS *East Coast Regional Foundry Conference.*

Pittsburgh . . **April 15** . . Webster Hall Hotel, Pittsburgh, Pa. W. O. Philbrook, Metals Rsch. Lab., Carnegie Institute of Technology, *"Solidification of Steel Castings."*

Quad-City . . **Apr 13** . . Hotel Ft. Arm-

strong, Rock Island, Ill. G. P. Phillips, Foundry Research, International Harvester Co., *"Shell Processes–Molding and Cores."*

Rochester . . Apr 2 . . Seneca Hotel, Rochester, N. Y., J. J. Watson, C. O. Bartlett & Snow Co., *"Modern Foundry Design Trends."*

Saginaw Valley . . Apr 4 . . Fischer's Hotel, Frankenmuth, Mich. W. G. Ferrell, Auto Specialties Mfg. Co., *"How Health and Hygiene Affect Foundry Cost."*

St. Louis . . Apr 18 . . Edmond's Restaurant, St. Louis. C. A. Sanders, American Colloid Co., *"What Sand for What Type Casting?"*

Southern California . . Apr 12 . . Rodger Young Auditorium, Los Angeles. M. E. Brooks, Dow Chemical Co., *"Magnesium Foundry Practice."*

Tennessee . . Apr 26 . . Patten Hotel, Chattanooga, Tenn. *Management Night.*

Texas . . Apr 19 . . Angelina Hotel, Lufkin, Texas. A. E. Stanfield, Lufkin Foundry & Machine Co., *Safety Discussion. Practical Castings Clinic.*

Timberline . . Apr 8 . . Oxford Hotel, Denver, Colo. W. A. Hambley, Chas. A. Krause Milling Co., *"Casting Defects."*

Toledo . . *No information available.*

Tri-State . . Apr 12 . . Oklahoma City. *Castings Clinic, Panel Discussion.*

Twin City . . Apr 9 . . The Covered Wagon, Minneapolis. H. F. Scobie, Non-Ferrous Founders' Society, *"Future Foundry Trends."*

Utah . . *No information available.*

Washington . . Apr 18 . . Engineers' Club, Seattle. M. E. Brooks, Dow Chemical Co., *"Magnesium Foundry Practice."*

Western Michigan . . Apr 1 . . Fingers', Grand Rapids, Mich. *Round Table, "Foundry Scrap."*

Western New York . . Apr 27 . . Trap & Field Club, Buffalo, N. Y. *Ladies' Night. Annual Spring Dance.*

Wisconsin . . Apr 12 . . Schroeder Hotel, Milwaukee. Sectional Meeting. Nonferrous Group: D. L. LaVelle, Kaiser Alum. & Chem. Sales, Inc., *"Aluminum Casting Defects and Their Correction;"* Gray Iron Group: V. G. Winget, Reda Pump Co., *"Melting of Gray Iron in Reverberatory Furnace;"* Malleable Group: C. A. Sanders, American Colloid Co., *"Malleable Molding Sands,"* Steel Group: H. F. Taylor, Massachusetts Institute of Technology, *"Mold-Metal Interface Reaction."*

MAY

Birmingham District . . May 17 . . Tutwiler Hotel, Birmingham, Ala. *Panel Discussion, "Core Practices."*

British Columbia . . May 15 . . Pacific Athletic Club, Vancouver. *Election of Officers.*

Central Indiana . . May 13 . . Athenaeum Turners, Indianapolis. C. E. Drury, Central Foundry Div., GMC., *"Gating to Control Pouring and Its Effect on Castings."*

Central Michigan . . May 15 . . Hart Hotel, Battle Creek, Mich. *Management Night.*

Central Ohio . . May 13 . . Seneca Hotel, Columbus, Ohio. D. C. Williams, Ohio State University, *"pH–Pardon, But Your Ions Are Showing."*

Corn Belt . . May 10 . . Steeple House, Beatrice, Neb. H. W. Northrup, International Nickel Co., *"Ductile Iron."*

Eastern Canada . . May 10 . . Sheraton-Mount Royal Hotel, Montreal. *Annual Business Meeting, Elections.*

Metropolitan . . May 13 . . Essex House, Newark, N. J., C. F. Walton, Gray Iron Founders' Society, *"Heading and Gating of Gray Iron."*

Mid-South . . May 10 . . Hotel Clarridge, Memphis, Tenn. *Election of Officers and Round Table Discussion.*

New England . . May 8 . . University Club, Boston. H. W. Schwengel, Modern Equipment Co., *"New Developemnts in Equipment for Melting."*

Northeastern Ohio . . May 16 . . Tudor Arms Hotel, Cleveland. *Old Timers' Night.*

No. Ill.-So. Wis. . . May 14 . . Lafayette Hotel, Rockford, Ill. Z. Madacey, Beardsley & Piper Div., Pettibone-Mulliken Corp., *"Core Making and Core Blowing."*

Oregon . . May 15 . . Heathman Hotel, Portland, Ore. *Tour through Oregon Steel Rolling Mills.*

Philadelphia . . May 10 . . Engineers' Club, Philadelphia. *"Air Pollution & Ventilation Problems in the Foundry."*

Rochester . . May 14 . . Seneca Hotel, Rochester, N. Y. *Election of Officers.*

Saginaw Valley . . May 2 . . Fischer's Hotel, Frankenmuth, Mich. N. J. Ellis, GMC, *"In-Plant Labor Relations."*

St. Louis . . May 16 . . Edmond's Restaurant, St. Louis. L. B. Knight, Lester B. Knight & Associates, *"Mechanization." Rolla Students' Night.*

Southern California . . May 10 . . Rodger Young Auditorium, Los Angeles. W. C. Baud, Mechanical Foundries Div., Food Machinery & Chemical Corp., *"The Foundry's Greatest Problem."*

Twin City . . May 14 . . The Covered Wagon, Minneapolis. C. W. Gilchrist, Cooper-Bessemer Corp., *"Riserless Castings."*

Western Michigan . . May 6 . . Bill Stern's, Muskegon, Mich.

Western New York . . May 14 . . Sheraton Hotel, Buffalo, N. Y., E. F. Hayes, Hanna Furnace Corp., *"Our Economic System."*

Wisconsin . . May 3 . . Schroeder Hotel, Milwaukee. *Annual Apprenticeship and Old Timers' Meeting.*

Classified Advertising

For Sale, Help Wanted, Personals, Engineering Service, etc., set solid . . 25c per word, 30 words ($7.50) minimum, prepaid.

Positions Wanted . . 10c per word, 30 words ($3.00) minimum, prepaid. Box number, care of **Modern Castings,** counts as 10 additional words.

Display Classified . . Based on per-column width, per inch . . 1-time, $18.00; 6-time, $16.50 per insertion; 12-time, $15.00 per insertion; prepaid.

Help Wanted

NON-FERROUS FOUNDRY SUPERINTENDENT required for mechanized foundry manufacturing brass valves, pipe fittings, plumbing supplies, etc. Graduate metallurgist preferred, with some experience on Detroit electric furnaces and knowledge of synthetic sand technique an advantage. Will have charge of all foundry operations including metal analysis, furnace room alloying, melting and pattern shop. Must be capable of setting up test laboratory and organizing metal control methods. Age under 50. Salary open. Apply to personnel department.

EMCO Limited,
London, Ontario

SUPERINTENDENT for non-ferrous foundry. Excellent opportunity for man with good educational background and sound practical experience. **Box D30, MODERN CASTINGS, Golf and Wolf Roads, Des Plaines, Ill.**

SALES SERVICE ENGINEER wanted by progressive producer of foundry supplies. This is a real opportunity for young foundry engineer with experience in sand and/or melting practices. College education is desirable. Ability to learn and develop is essential. Send complete record. Address: **Box D26, MODERN CASTINGS, Golf and Wolf Roads, Des Plaines, Ill.**

OPPORTUNITY for man experienced in precision investment casting to set up and operate new department. Prefer some one with background in metallurgy and experience in manufacturing to government aircraft specifications. Send resume of experience and other details to: **Norgren-Stemac, Inc., 1277 So. Cherokee St., Denver 23, Colorado.**

WANTED competent and aggressive core-room foreman to take complete charge of core-room in modern jobbing and gray iron foundry making castings from ounces to 10 ton. Send complete resume in first letter. **Address Box D41, MODERN CASTINGS, Golf and Wolf Roads, Des Plaines, Ill.**

PATENT ATTORNEY OR AGENT. Progressive company in metals field with modern offices in metropolitan New York has opening for patent attorney or agent capable of handling a diversity of matters in established patent department. General experience in all phases of patent preparation and prosecution desirable along with a technical education and training in chemistry and/or metallurgy. Permanent position with good opportunities and liberal policies, including numerous employee benefits. In replying, please furnish detailed summary giving patent experience, legal and technical education, age, marital status, and salary requirements. **Box D37, MODERN CASTINGS, Golf and Wolf Roads, Des Plaines, Ill.**

OVERSEAS OPPORTUNITY
Minimum of Eighteen months service
Melters, molders, core makers, men with general foundry training to staff new operation in South America. Experience with automotive and malleable castings desirable. Send complete information, including salary requirements and recent photo. **Box D36, MODERN CASTINGS, Golf and Wolf Roads, Des Plaines, Ill.**

MANUFACTURERS AGENT WANTED. Established machanized gray iron jobbing foundry has need of top quality man to represent them in Chicago area. Submit details, reply to **Box D38, MODERN CASTINGS, Golf and Wolf Roads, Des Plaine, Ill.**

MANUFACTURING RIGHTS

This advertisement invites manufacturers or companies willing or wishing to arrange for the manufacture in Australia of any Engineering or steel products to briefly describe any proposals which are considered suitable for increasing manufacturing activities in Australia and likely to be in heavy demand or meanwhile any suitable agencies in the engineering field. We have extensive manufacturing facilities. All replies treated with utmost confidence. Please write **Box D39, MODERN CASTINGS, Golf and Wolf Roads, Des Plaines, Ill.**

Positions Wanted

What have you to offer the abilities of an ambitious practical foundryman who has visited over 100 foundries on technical sales and who has worked in all capacities from molder and coremaker to sales and owner. Well versed in non-ferrous and iron production and jobbing castings. Familiar with latest techniques in shell molding and CO2. Will travel, available immediately. **Charles Lay, R. D. #2, Norwich, New York.**

SUPERINTENDENT or **INDUSTRIAL ENGINEER.** BS in chemical engineering, 1938. Nineteen years experience in mechanized brass, nickel alloys, and aluminum foundries. Know blended sand control, metallurgical melting, and scrap control. Five years experience in industrial engineering in semi-jobbing and production foundries. **Box D40, MODERN CASTINGS, Golf and Wolf Roads, Des Plaines, Ill.**

MANAGER-GENERAL SUPERINTENDENT. Foundryman, late thirties, extensive background in good foundries from metallurgy and foundry engineering through superintendency and management, seeks management position with progressive steel or gray iron organization, preferably one requiring improvement or rejuvenation. Presently employed in executive capacity with large company, but wishes position of greater responsibility. **Box D34, MODERN CASTINGS, Golf and Wolf Roads, Des Plaines, Ill.**

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WESTOVER CORPORATION
Consultants
Exclusively serving the foundry industry since 1930
Mechanization—Modernization
Labor Relations—Incentives—Systems
Cost and Production Control
Plant Layout—Management
3110 W. Fond du Lac Ave., Milwaukee 10, Wisconsin

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Consulting Foundry Engineers
Modernization, Processing Layouts
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For Sale

MOLDING MACHINE: Herman 6000# capacity, jolt-roll-draw in operating condition. $2,900.00 FOB Pottstown Machine Co., Pottstown, Pa. (Phone 37, H. H. Houston)

FURNACES FOR SALE
10 used Heat Treating Furnaces, and two 7-ton gantry cranes, good condition, priced to sell.
BAER STEEL PRODUCTS. INC.
Box 1428
Boise, Idaho

Get results with MODERN CASTINGS ads.

casting through the ages

ODD BITS

MOST FOUNDRYMEN OF THE EARLY 1890's WERE SO CERTAIN THAT MOLTEN STEEL, POURED INTO GREEN SAND MOLDS WOULD EXPLODE, RUN OFF OR BUBBLE, THAT THEY JEERED THE FIRST ATTEMPT TO PRODUCE STEEL TRUCK WHEELS IN MOIST MOLDS (ABOUT 1892). JEERS TURNED INTO CHEERS, HOWEVER, WHEN THE CASTINGS PROVED SATISFACTORY.

obituaries

B. A. (Bonny) Miller, 55, vice-president and general manager of Crown Non-Ferrous Foundry, Inc., Chester, Pa., died February 17 after a ten-day illness.

Nationally known in the brass and bronze industry, Mr. Miller was also an active worker in the foundry educational field. As a member of the

B. A. Miller

American Foundrymen's Society he served as director, vice-chairman and chairman of the Philadelphia Chapter; chairman of the Brass and Bronze Round Table committee; member of the Brass and Bronze Division executive committee for more than ten years, and member of the Nominating Committee in 1949-50.

Mr. Miller graduated from Loyola College, Baltimore, Md. in 1925. His first position was with the Bartlett-Hayward Division of the Koppers Co., which he left in 1934 to become chief metallurgist for the Baldwin Locomotive Co., a position he held until 1945.

He served as a member of the American Bureau of Shipping Propeller Wheel Committee and the Brass and Bronze Foundries Industry Advisory Committee, N.P.A., Department of Commerce.

Norman C. MacPhee, 60, Chief of the Physical Metallurgy Division of the Mines Branch, Dept. of Mines & Technical Surveys, Ottawa, Canada, died February 11. A graduate of Queen's University, Kingston, Ontario, he worked for a number of foundries in the United States and Canada before joining the government service in 1941.

Mr. MacPhee served as director of the Eastern Canada Chapter of AFS 1949-1952. He served on a number of committees of the Canadian Institute of Mining and Metallurgy and was a member of American Society for Metals.

Joseph F. Joy, 73, founder of the Joy Manufacturing Co., Pittsburgh, Pa., died February 19 at his home in Ft. Pierce, Fla. His name was synonymous with mechanized mining equipment. He invented the first coal loading machine, patented in 1916. His inventions included conveyors, locomotives, drills, cutters, pumps, hydraulic jacks, hoisting mechanisms, tunneling machines and motors.

Dr. Ernest P. Irany, 61, member of the research and development department of Norton Co., died suddenly January 11.

He received his doctorate degree in Chemistry in Vienna, Austria and a degree in Patent Law from Columbia University. He was recognized as an expert in the field of synthetic organic chemistry.

Dr. Irany was an active member of the American Chemical Society. Prior to 1949, when he became associated with Norton Co. he had been with the Celanese Corp. of America and the Shawinigan Chemical Co. of Montreal.

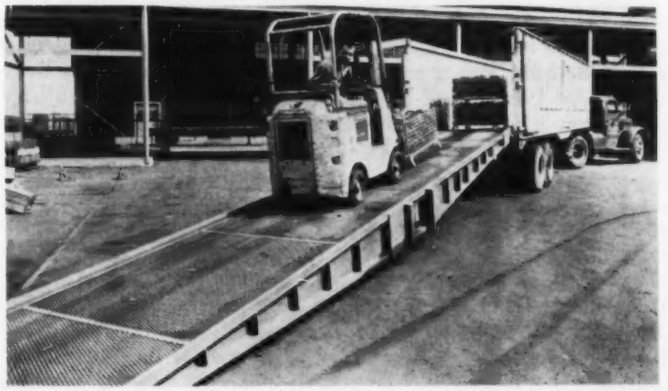
Hans Wickstrom, retired sales representative for Norton Company's Grinding Machine Division, died at his home in Worcester, Mass. February 13 at the age of 86. He had been associated with the company for forty years and helped build the first Norton cylindrical grinding machine in 1900.

Andrew H. McDougall, retired vice-president of Whiting Corp., died March 10 in South Holland, Ill. Mr. McDougall, a mechanical and civil engineer, was graduated from the University of Michigan in 1901 and joined Whiting Corp. in 1903. He served as a designer, chief draftsman, and chief engineer and was a vice-president from 1919 until his retirement about 10 years ago.

Charles A. Gutenkunst, Jr., president and treasurer, Milwaukee Malleable & Gray Iron Works, Milwaukee, died Feb. 16. He had shared in the management of this company with his brother, Joseph B. Gutenkunst, since 1931.

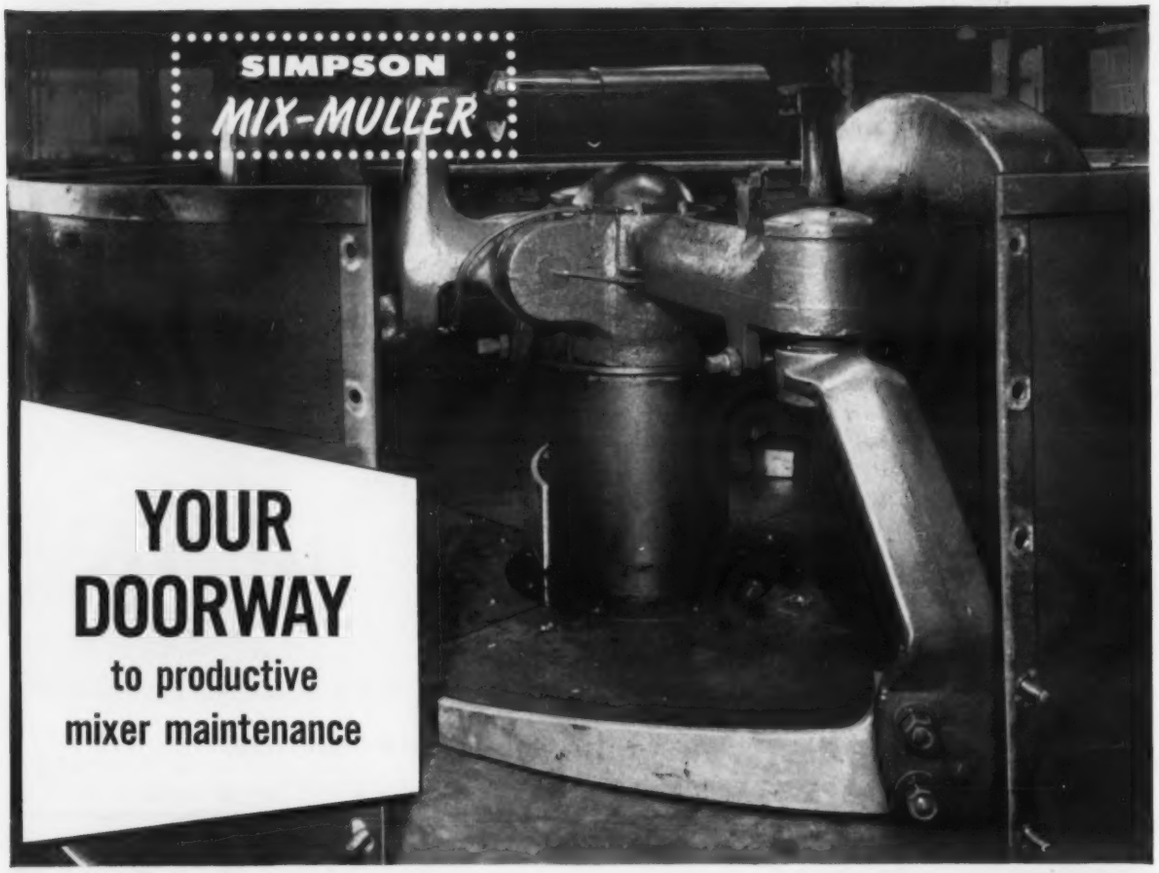
Answer questions by sending for data describing the newest products and processes. Order by using cards on **page 7-8.**

Ramp Cuts Trailer Unloading Time



Here's how Warren Webster Co., Camden, N.J. cut trailer unloading time 80 per cent with a portable aluminum yard ramp. The problem involved unloading the truck, weighing the castings and putting them in storage. The scale and storage are at ground level. The trailer now parks near the scale, one man without powered equipment moves the ramp into position and unloads with a fork lift truck. The castings go directly to the scale and then to the adjoining storage area.

Previously the trailer backed into the loading dock, the castings were moved from the trailer to the dock, down an elevator to the ground level, through 1500 ft of aisles then to the scale and storage area. *Magnesium Co. of America.*



The photo above, shows one reason why it's easier to get a full work load out of the Simpson Mix-Muller. Every moving part inside the mixer can be taken out through this easily removable section of the crib. You can see how easy plow and muller settings can be made. Lubrication is made from the crosshead which is accessible from the dust hood inspection door. Note, too, the replaceable *steel* wearplates—designed to give you long trouble-free wear.

Easy access to areas of the machine that require periodic check is only one of the many *little* details that pay *big* operating dividends when you use Simpson Mix-Muller. Centralized lubrication provides "one stop" service and spring loaded mullers give you the correct mulling pressure for your sand—at the turn of a wrench. A positive sand sampler can be located anywhere on the crib section and provides immediate *safe* sampling.

These are several *good* reasons why the new F Series Simpson Mix-Mullers make it easier for you to *make the most* of the most thorough mulling action ever developed. Available in batch capacities of from 25 to 4000 lbs.—there's one to suit *your* requirements.

Write for details and remember . . .

AT NATIONAL . . . MIXING IS OUR BUSINESS

NATIONAL Engineering Company
630 Machinery Hall Bldg.,
Chicago 6, Illinois

CIRCLE NO. 196, PAGE 7-8

BOTTOM DISCHARGE empties pan quickly, thoroughly. Is *automatic* with plow action. Requires no extra power.

SAFE POSITIVE SAMPLING. Sand sampler can be located anywhere on the crib. Action is fast and safe.

advertisers and their agencies

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The Apex name on alloy ingot is verification that here is superior alloy as specified for your sand, permanent mold or die casting. You *know* you're getting quality. Economy, too . . . in the trouble free casting that comes of superior castabillty, composition and recovery. Specify Apex—for better castings, customer satisfaction and dollar profit.

Apex Smelting Company

CHICAGO · CLEVELAND · LOS ANGELES

modern castings

CIRCLE NO. 198, PAGE 7-8